Federation of Rhodesia and Nyasaland

REPORT
of the
SECRETARY
to the
FEDERAL MINISTRY OF AGRICULTURE
For the Year Ended 30th September, 1955

Presented to the Federal Assembly
1956

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ERRATA

PAGE 5. Line 31, for "Seluke" read "Soulouk".

PAGE 6. Under "Cattle", third line of paragraph, after "decision of Government" delete the words "based on advice largely prepared by this Branch.".

PAGE 97. Line 24, after "had aborted" insert *a comma.*
Line 25, before the words "the serum neutralization tests" insert "for".

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REPORT OF THE SECRETARY TO THE FEDERAL MINISTRY OF AGRICULTURE WHICH INCLUDES THE DEPARTMENTS OF RESEARCH AND SPECIALIST SERVICES, CONSERVATION AND EXTENSION SERVICES AND VETERINARY SERVICES, FOR THE YEAR ENDED 30th SEPTEMBER, 1955

J. R. CORRY, Secretary for Agriculture

I.—INTRODUCTION

The season 1954/55 was characterized by rainfall which over the great part of Southern Rhodesia, was above normal. Matabeleland had the wettest season experienced for some years. Although the season cannot be described as ideal due to excessive rains in certain areas, nevertheless record crops were obtained for both maize and tobacco, whilst cattle slaughterings were slightly in excess of the previous year's level and milk production showed a substantial increase over the preceding year's record figures.

These yields are not entirely attributable to favourable seasonal conditions but are also the result of improved farming methods as well as the more general application of the results of scientific research coupled with a widening appreciation of the principles of good husbandry. Considerable progress has in fact been made in these directions in recent years and tremendous interest continues to be shown by the farming community generally in the work of the agricultural research stations and in the activities of the Conservation and Extension Department.

Progress continues also to be made in the livestock industry. Water supplies and grazing were adequate throughout the year and a steady improvement is noticeable in care, feeding and management of both dairy and beef herds.

On the whole the Agricultural year has been a period of continued relative stability in the general economic climate of both the Federation and the wider world. Economic activity everywhere has continued at a high level, the dismemberment of wartime controls and restrictions on trade has proceeded apace, and with one or two exceptions there has been a general tendency on the part of commodity costs to steady out or ease. In line with this, prices of many farm requisites have fallen, though on balance farm costs in the Federation have shown an upward movement due to rises in African wage-rates and increases in local transport costs. In many cases farmers have had to absorb these rising costs in the face of stable prices for their products, but in spite of this the effects of a fourth consecutive favourable season resulting in bumper maize and tobacco crops have ensured, in general, a year of general farming prosperity.

II.—ADMINISTRATIVE SERVICES

General

The Inter-territorial Working Party, which was set up shortly after Federation to advise, amongst other things, on the practicability of making European Agriculture and Animal Health in Northern Rhodesia Federal subjects, and to recommend on the steps which should be taken to put this into effect, completed its final Report.

In its report the Working Party accepted, *inter alia*, the principle that since European agriculture in Southern Rhodesia and most of the major instruments of agricultural policy were in the hands of the Federal Government, it was desirable, particularly in the face of the paramount need for self-sufficiency in basic foodstuffs, that all agricultural services should, at some future time, fall to common responsibility and that it would be advantageous for Northern Rhodesian European agriculture to become Federal as soon as practicable; moreover the transfer of Northern Rhodesian agriculture to Federal responsibility would not only facilitate essential co-ordination of research, of agricultural extension services, and of administrative arrangements, but would also bring important political advantages to the European farmers. The Farmers' Unions of the two territories had already amalgamated and it was desirable that Northern Rhodesian producers should have the same direct access to the Federal Minister as was available to their counterparts in the South. The Working Party concluded that it was essential that the agricultural industry should have a strong voice in the Federal Government in order that the needs of the development of agriculture were given proper place and that this would be greatly assisted by the transfer to Federal control of European agriculture in Northern Rhodesia.

Agreement was finally reached, during the year between the Federal Government and Northern Rhodesia Government that certain aspects of non-African agriculture in Northern Rhodesia viz. the Conservation and Extension services—

but not Animal Health or Research Services — would become a Federal responsibility at an early date.

The Committee charged with investigating Cattle and Beef Marketing in the Federation as well as the Federal Standing Committee on Prices and Markets, both of which were established in accordance with the recommendations of the Inter-territorial Working Party's Report, completed their various enquiries and submitted Reports to the Federal Government. The Standing Committee on Prices and Markets, in reporting on Federal Maize Marketing, emphasized that an essential concommitant to its recommendation that the determination of maize prices should be the responsibility of the Federal Government, was the assumption by the Federal Government of the responsibility for marketing of the crop and that this in turn demanded the closest degree of integration of the Territorial marketing organizations as well as the exercise by Federal Government of a large measure of control. The Committee accordingly recommended that there should, in principle, be some form of organized marketing on a Federal scale for maize and that a Federal Grain Marketing Board should be set up; pending the establishment of a Federal Grain Marketing Board, however, the Committee recommended that an interim liaison body should be appointed to investigate all the problems that would be likely to face the Federal Grain Marketing Board when appointed.

This recommendation of the Standing Committee was accepted by the Federal Government and an Interim Committee was set up for the purpose of preparing the way for a Federal Grain Marketing Board; this Committee had not completed its inquiries at the end of the period under review.

The Inter-territorial Working Party also called attention to the fact that the determination of the place of African agriculture, vis-a-vis, European agriculture was one of the most important matters facing the future of the Federation and that notwithstanding the fact that African agriculture was clearly and exclusively a Terriorial matter in all three Territories, it was essential that there should be not only the fullest possible exchange of views on all agricultural matters, but that the Federal Minister of Agriculture should be kept fully briefed on all matters of agricultural policy throughout the Federation.

The Working Party accordingly recommended the appointment of a special committee, on which all three Territories and the Federal Government would be represented and which would have the following terms of reference:—

(a) generally to consider all matters of agricultural policy throughout the Federation;
(b) to consider any specific matters of agricultural policy referred to it by the Federal Minister of Agriculture or by the Territorial Governments;
(c) to initiate consideration of any matters of agricultural policy;
(d) to make recommendations from time to time to ensure that the closest co-operation is developed and maintained between the Federal Agricultural Department and the Territorial Governments.

This proposal was accepted by the Federal Government and the Committee now designated as the Standing Committee on Agricultural Production was appointed.

The Working Party also called attention to the fact that the problems of agricultural research throughout the Federation are largely the same and that it would be advantageous to have some measure of co-ordinated approach to these problems. It accordingly recommended that a special research advisory committee should be established with the following terms of reference:—

(a) to keep in touch with agricultural research in progress in the Federation;
(b) to consider and recommend modifications on additional research required in the Federation;
(c) to advise on whether any such expansion should be made by territorial Departments or be undertaken by the Federal Department;
(d) to consider and advise on specific agricultural research problems referred to it.

This recommendation of the Working Party was also accepted and the Research Advisory Committee was duly appointed.

Agricultural Economics and Marketing

The greater part of the time of the Chief Agricultural Economist has been taken up with new functions arising out of the Federation. He has been intimately concerned with the detailed proposals for the transfer to Federal control of European agriculture and of marketing arrangements in Northern Rhodesia and has also served as Chairman of the Special Committee set up to arrive at detailed arrangements for the Federal marketing of maize and as a member of the Standing Committee on Prices and Markets and the Standing Committee on Agricultural

Production. He attended the Ninth Session of the Contracting Parties to the General Agreement on Tariffs and Trade in January in connection with proposals to establish a body to govern international trade in primary commodities and attended discussions in London concerned with the marketing of Federal tobacco. He was also a member of the team which negotiated the Trade Agreement between the Union of South Africa and the Federation in Cape Town and the Commonwealth of Australia and the Federal Government, and the Administration of the Bechuanaland Protectorate and the Federal Government in Salisbury, and he was also a member of the body which produced the final Federal tariff.

The Branch has continued its association with the Agricultural Marketing Council, a member of it has served as Secretary to the Council, and the Chief Agricultural Economist has attended all its meetings in an advisory capacity. The necessity of this close link between these two bodies has proved itself and provision is being made for its continuation in the proposed Federal statute.

The Branch has continued to be responsible for the Co-operative movement and detailed proposals have been worked out for amendment to the existing legislation.

Throughout the year the Branch has provided a steady volume of information on the economics and marketing and on the production and pricing of agricultural products throughout the Federation and in respect of the various parts of the world.

The Chief Agricultural Economist, or a member of his staff, has attended all meetings of the Cold Storage Commission and of the Grain Marketing Board and of the Dairy Marketing Board.

The Branch has also continued to operate the Cattle Sales Permit Control and the new Control of Goods (Cattle Slaughter) Regulations, and to administer agricultural import and export controls relating to the control of products throughout the Federation.

Agro-Economic Survey and Cost Inquiries

Field work on the Agro-Economic Survey was finally completed in August and progress in the analysis of data relating to the medium and low-rainfall areas has been as rapid as possible bearing in mind the other commitments of the Branch. It is hoped that a final draft report will be completed early in 1956.

The Branch has completed its three year inquiry into costs of milk production. This survey has been of great value to Government and has been most warmly welcomed by the producers co-operating in it. It has revealed many weaknesses in milk production systems and farmers have not been slow to take advantage of the information it has made available, to put their houses in order, increase their efficiency and decrease their costs. This survey has proved a classic example of co-operation between officials obtaining information for price determination purposes and farmers requiring sound data on which to base the management of their own concerns.

During the year the Branch has conducted a routine inquiry into the cost of maize production as required under the terms of the Government's agreement with the Rhodesia National Farmers' Union and a full scale Farm Management Inquiry designed to ascertain the financial position of the maize producing community has been launched in Northern and Southern Rhodesia.

A new aspect of the Branch's functions has been the assistance given to the Department of Conservation and Extension with its farm planning work. The economic aspects of this advisory programme are of paramount importance and expansion of the Branch's activities in this direction are inevitable as time goes on.

Rhodesia Agricultural Journal and Library

Rhodesia Agricultural Journal

The contract for printing the Journal remains with Messrs. Art Printing Works. During the past year the contractors have brought out the various issues on time which is a great improvement.

At present 2,000 copies are printed per issue. During the year a circular publicising the Journal was circulated to farmers and this brought in more subscribers.

Reprints from the Journal are very popular and find a ready sale at the Government Stationery Office (Publications Section).

The Sabi Research Station Report was edited for publication.

Library

The usual routine matters of indexing, cataloguing and distribution of literature were carried out.

The Librarian continued to act as Secretary of the Library Committee and was responsible for transmission of book requisitions to the Government Stationery Office and for checking and distributing book orders on arrival, in addition to certifying accounts for same.

The various Professional Officers welcomed the increase in the book allocation which will enable them to build up more adequate libraries.

There is a very urgent need for more library accommodation and an extra storeroom for Rhodesia Agricultural Journal Bulletins. Both present buildings are completely full and it is impossible to accommodate further literature.

III.—CROP PRODUCTION

Maize

The total acreage planted to maize by Europeans for the 1954/55 season increased from 359,709 acres in the previous year to 364,000 acres in 1954/55 whilst the total yield reached the record figure of 2,737,000 bags against 2,698,314 bags in 1953/54, the average yield per acre remaining however at the same figure of 7.5 bags for each of the two seasons.

The handling of this record crop following on a good season the year before placed a considerable strain on the transport and marketing organizations and the Grain Marketing Board was faced with the open bulk storage of a considerable quantity of maize in spite of the completion of the new Aspindale Silo project.

During the year the Ministry assumed responsibility for the determination of the Northern Rhodesian maize price at the level of the Southern Rhodesian price plus a territorial incentive of 2/6 per bag, less the Northern Rhodesian price of the bag, for all maize delivered to Northern Rhodesia Maize Control Board Depots. Prolonged discussions took place with a view to incorporating the Nyasaland maize price in the Federal scheme but these broke down at the last moment and it was finally agreed that Nyasaland should continue to export its surplus maize to best advantage on the world market on the understanding that the Federation would have first call on these supplies at world price equivalent in the event of shortage.

At the present time the overall maize supply position of the Federation seems fairly satisfactory, as both Southern and Northern Rhodesia are carrying useful reserves in storage.

Small Grains — Kaffir corn and Munga

Following on the Grain Marketing Board's difficulties in handling the embarrassingly large surplus of kaffir corn and munga mentioned in previous reports, and following also upon representations that the commercial value of these grains was lower than that of maize, the producer price for the 1954/55 crop of munga and kaffir corn was reduced by 5/- a bag. Unfortunately this drop coincided with a mediocre season, particularly affecting the low rainfall areas, and has led to a shortage of these grains coming on to the market whereas artificial consumption stimulated under subsidy has increased especially in the case of munga. Consumption has been further increased in consequence of the virtual failure of the rupoko crop and the substitution for this grain of munga in brewing. In consequence the position of the Grain Marketing Board has been changed from one of acute over-supply to one in which it has had to introduce rationing in order to harbour its limited stocks and ensure their equitable distribution.

Groundnuts

The position in Southern Rhodesia continues to be unsatisfactory in so far as the European producer is concerned and the acreage planted further declined to 6,651 acres. Details of deliveries to the Grain Marketing Board, however, indicate that an improvement in yield per acre resulted in the total production of 66,352 bags of unshelled nuts which is the highest level for many years. African production for market is running at approximately the same level. The price was maintained for the 1954/55 crop at 70/- and 80% of the output has been disposed of to the local oil expressors. There have been no changes in the general marketing arrangements.

Potatoes

The summer crop in 1954/55 was again severely attacked by blight and late rains extended the depredations of this plant disease to the first irrigated crop. In consequence the second irrigated crop in the early summer of 1954 was the only successful potato crop of the year under review. Considerable attention has been given during the year to the problem of providing blight resistant varieties of potatoes. Up to the present the Kenebec has been the most successful but it is not a particularly acceptable potato from the domestic consumer point of view and a great deal of research is required into this aspect. Unfortunately potato

shortage periods this year have coincided with short production periods in the Union of South Africa and although this traditional source of supply has been able to assist with part of our requirements supplies have been at well nigh prohibitive prices.

Rice

Under the stimulus of a guaranteed market made possible by virtue of import controls operated by this Ministry producers in Nyasaland have now succeeded in growing all the rice requirements of the Federation at prices only slightly in excess of world values.

Tobacco

Tobacco has again had an excellent season and for the third year in succession production in Southern Rhodesia has struck an all time record. Production of nondescript types has, unfortunately, remained high though slightly below last year's level (22.55%) with the daily percentage, particularly towards the end of sales, rising to as high as 51%. Notwithstanding this fact a great deal of very much better tobacco was produced and generally speaking buyers have been most favourably impressed by the quality of tobaccos offering in a year which has been a difficult one from a production point of view. During the year there were 2,651 growers, an increase of only 19, of this total 234 were growing for the first time. There was a slight revival of interest in the production of Turkish tobacco, the number of registered growers rising from 408 to 528, of whom 106 were African producers (11 more than the previous year) growing this crop under the auspices of the Southern Rhodesia Department of Native Affairs.

The yield of tobacco harvested during the season was approximately 121,000,000 pounds as compared with 120,252,000 pounds of flue-cured tobacco in 1953/54. Not only was this a new record but it was considerably in excess of the most optimistic crop forecasts.

The fire-cured Virginia crop in Southern Rhodesia declined further to 276,726 pounds, a decrease of over 50%.

The production of Turkish tobacco remained relatively stable with both Seluke and Samsun varieties being grown.

The opening of sales for the 1955 season coincided with the introduction of the Rhodesia Tobacco Marketing Board which took over responsibility for the Southern Rhodesian, North-Western and North-Eastern Rhodesian virginia crops.

Sales of Southern Rhodesian flue-cured Virginia tobacco amounting to 120,558,912 pounds resulted in a total realization of £20,326,475.11.9d., an increase of over £1,000,000 on the previous year. Despite the high proportion of nondescript types however, and against the general easing of world tobacco prices the values of good quality tobaccos here increased and the average price of tobacco sold rose from 38.35d. per lb. for 1954 to 40.46d. per lb. for 1955.

Sales of North-Western Rhodesia flue-cured Virginia tobacco amounted to 5,363,880 pounds at an average price of 37.82d. per lb. or a total value of £845,474.19.1d., all figures showing an increase on the previous season.

Sales of North-Eastern Rhodesian flue-cured Virginia tobacco amounted to 2,242,139 lb. or approximately half a million pounds less than the previous year. The average price also declined slightly from 27.47d. to 27.21d. per lb. and the crop realized only £254,233.0.7.

Detailed discussions have continued on the future of the marketing of the North-Western and North-Eastern Rhodesia crops without identification from the Southern Rhodesian crop. At the time of writing it appears likely that buyers will agree, as growers have already agreed, that the North-Western Rhodesia crop should be marketed unidentified.

A new feature of the 1955 season was the re-entry of the South African buyers into our market for substantial quantities of tobacco and during the current season they have purchased over 5½ million pounds. Notwithstanding the heavy crop the United Kingdom has once again been unable to secure its requirements from the Southern Rhodesian crop in the face of severe competition for its traditional grades. The market has again been well supported by continental buyers who have, however, during the course of the season, indicated their uneasiness at the disparity between American and Rhodesian prices. The comparative figures in respect of destination of purchases are set out below:

Destination	1953/54 *Crop*	1954/55 *Crop*
United Kingdom	57·93	53·88
Australia	8·36	8·01
Local Markets	5·68	5·20
Union Markets	—	4·65
Other Markets	28·00	28·18
Unallocated	00·03	00·08
	100·00	100·00

Purchases of the North-Western Rhodesian crop have closely followed those for the Southern Rhodesian crop except for Australian and Continental markets which have shown greatly reduced interest. Support for the North-Eastern crop has come principally from the Continental markets.

The Chief Agricultural Economist was present at a meeting of the Board of Trade in London at the Commonwealth Relations Office, in January, 1955, when the Federal representatives were warned that the United Kingdom manufacturers were disturbed by the increasing disparity between Southern Rhodesian and American tobacco prices and were being forced by the demands of competition to use increasing amounts of the latter in their export brands. They emphasized again that the Southern Rhodesian problem was a quality problem and that there are very few years left for Southern Rhodesia to deal with this matter before it is left to face the full force of international competition without assistance from currency or other regulations. The tobacco world, of course, is well aware of this and its programme for the 1955/56 season aims at a target production of 140,000,000 pounds out of which it is anticipated that the United Kingdom will be able to obtain all its requirements.

Cattle

During the year producers have pressed again for the introduction of a long term price guarantee in respect of cattle and the main feature of this year is the decision of Government based on advice largely prepared by this Branch, to accept as a basic price for five years, the price of 97/- per 100 lb. cold dressed weight and with certain safeguards to adjust this annually for changes in ascertained costs of production. It was felt by Government that in the face of this, a reasonably stable period could be looked forward to in the cattle industry. All available indications suggested that this was an acceptable level of prices and that although up to date cattle production appeared to be falling short of consumer demand, some improvement could nevertheless be anticipated. About the beginning of the year, however, the report of the Federal Cattle and Beef Marketing Committee called for major overhaul of the cattle marketing system to take account of the widely differing systems prevailing in Northern Rhodesia and in Southern Rhodesia. Despite prolonged and careful negotiations no agreement could be reached except one directed towards the establishment of a small Board to control imports of beef and cattle and interterritorial movements of livestock. It was hoped that arrangements could be made upon these lines.

Pigs

The past twelve months have seen a complete reversal of the expansionary trend noted in the previous report. The collapse of the export market, resulted in heavy loss to the National Pig Breeders Co-op. Ltd. The Co-op. was, therefore, unable to pay its annual bonus, which pig producers had come to look upon as part of their producer price. A further effect of the loss of a profitable export market was the necessity to raise bacon prices on the local market. At the same time, this rise was partly cushioned by selling bacon at three different prices depending on the cut; a long over-due step. Throughout most of the year little progress appeared to be made regarding the necessary re-organization of the pig industry, except that the Pig Industry Board employed a leading Danish consultant, Mr. Wernberg, to advise on the position regarding their bacon factories. He advised the construction of two new factories, one in Salisbury and one in Bulawayo, but his advice was not accepted by all the interested parties without qualification and in the face of these conflicting opinions and of increasing production costs coinciding with a fall in the effective price received, it is not surprising that producers rapidly lost confidence, and that pig numbers started to fall at first slowly, but later with increasing momentum. In September, 1954, the total pig population in Southern Rhodesia was 57,845 and this dropped to 46,967 by June 1955. During the same period the numbers sold per quarter fell from 20,241 to 15,338, a drop of 25%.

However, it is pleasing to be able to report that a clear and definite policy for the pig industry has now been agreed, and a start made upon its implementation. Further, the market for pig products has also recently improved. Within the Federal area, the market in Northern Rhodesia is now open to Southern Rhodesian producers. Previously this market had been supplied very largely from the Union. This new market, coinciding with the fall in production, has led to a shortage of bacon, and it has been necessary to import bacon at times during the year. Overseas markets have also improved, and once more offer profitable opportunities for surplus production. On the manufacturing side, the Cold Storage Commission has completely re-organized its pig factories, and agreement has been reached upon the construction of two new pig factories in the near future. The most tangible and immediate improvement to the producer has been the new price and grade structure, which came into effect on the 1st October, 1955. The new price structure provides for a range of prices within which the actual price can vary depending on the supply and demand position,

and the producer price for top grade baconers was immediately raised by 1½d. per lb. cold dressed weight. It is confidently believed that the industry is now on a sound footing, and it is expected that pig numbers will start to rise again.

Milk

The Dairy industry has experienced another healthy year. Over the last 12 months milk production has again showed an increase from 6,487,203 gallons to 7,807,598 gallons, just over 20%. With the continued reorganization of milk marketing, sales of wholemilk have again increased though not to the same extent as production. This rose to a level of approximately 10% in excess of the previous period and in consequence the surplus milk problem was accentuated with this amounting to just over one and three-quarter million gallons.

There has been some grumbling over milk prices but the figures quoted above, together with continued entry into the wholemilk industry of new producers, numbers of which showed an increase of 13% during the period under review, do not indicate an unhealthy state of affairs. The total number of milk producers is now 364.

With the increase in surplus milk supplies production of cheddar and gouda cheese is now adequate to supply the whole of Southern Rhodesia and Nyasaland requirements. Northern Rhodesia is, however, committeed under the terms of an agreement with the Union of South Africa until the end of 1956 and imports continue into this territory.

The year has seen the completion of the Dairy Marketing Board's initial programme for the reorganization of milk marketing. It has completed the construction or renovation of four of the dairies under its control, namely Gwelo and Umtali where new dairies have been completed and brought into operation and Gatooma and Que Que which have been completely altered and where modern equipment has been installed. Further progress has been made in obtaining a dairy site for the proposed new Salisbury dairy.

In addition to overcoming its early difficulties in connection with the manufacture of cheddar and gouda cheese, the Board has commenced the manufacture of roquefort cheese at its Gatooma dairy and it is likely that all Federal requirements will be met from this new function in the near future.

The Board has been conscious of the need to increase the consumption of milk and trial shipments have been sent from Salisbury to Lusaka by road tanker very successfully. Investigations have already been made as to the possible market in Beira and Lourenco Marques.

Poultry and Eggs

The poultry industry has experienced a fairly stable year, hatcheries have been busy over an extended period and neither severe glut nor severe shortage have been recorded. Production of eggs appears to be approximately adequate to Federal requirements and imports of these previously permitted into the Northern Rhodesian area have now been eliminated and the Northern Rhodesian market has proved a stabilizing factor so far for Southern Rhodesian producers. The production of quality table poultry continues to run very much below demand. Northern Rhodesian merchants are importing heavy quantities of caponized fowls 14 to 16 weeks old, gutted with head and feet removed, and case packed, amounting at the present time to over 2,000 head per week. Supplies have been unavailable in Southern Rhodesia or where they have been forthcoming have comprised either old hens or native type fowls. The prospects of expansion in this direction present a stimulating challenge to the Federal poultry producer and in order to assist him in this notice has been given that imports of poutlry will be progressively reduced over the next 12 months

V—RESEARCH AND SPECIALIST SERVICES

R. R. STAPLES — ACTING DIRECTOR OF RESEARCH AND SPECIALIST SERVICES

INTRODUCTION

The Department of Research and Specialist Services in addition to the Head Office organization includes six Specialist Branches, five major Research Stations, four small Stations dealing with particular problems, and one Agricultural College. While the financial provision required for these technical services to the farming industry may seem large, it should be realized that Southern Rhodesia, with its variable but vigorous climate and its many problems affecting production of both crops and stock, is in need of all the knowledge agricultural science can provide.

In any progressive country in the world to-day much attention has to be devoted to "agricultural specialist services" e.g. milk recording, control of plant diseases and pests, analysis of soils for farmers, soil surveys etc. etc. Because of this the impression is created in the lay mind that large sums of money are devoted to agricultural research, but these services have little or nothing to do with research, although rightly falling within the same Department in a comparatively small Service such as ours.

It has been stated also that sufficient scientific knowledge exists to last us for many years, if the farmer can only be persuaded to apply it. Unfortunately, this is far from the truth. Not only are there important gaps in our knowledge of how to achieve maximum production, but what is even more important is the uncertainty about the correct integration of the knowledge which is available into farming systems suited to environment.

In the United States the average yield per acre for a number of crops, for the country as a whole, has been compared with yields at research stations, where it can be assumed that the known scientific facts have been applied to the maximum. It was shown that per acre yields at research centres are usually double and more than that of the country average. Both, however tend to remain constant at any level of knowledge, and much scientific energy has to be expended on fighting diseases and natural soil deterioration to maintain these averages. New levels of production, i.e. yields per acre, only come about with the discovery of a new technique and the attainment of a new ceiling of knowledge. An interesting point which arose from the study is that in American agriculture the time lag between the discovery of a new technique and its general application is about ten to fifteen years.

These facts which in broad principle apply also to this country, demonstrate forcibly that for this Department to be effective it must consist of a solid core of research officers for the evolving of new techniques, and closely associated with it groups fighting disease and insect pests or providing specialist services not only direct to the farmer but to the Department of Conservation and Extension. Viewed in this light the provision for research is vital to the future welfare of the country.

Research Advisory Committee. This Committee with the Director as Chairman, and the Chief Pasture Research Officer, Chief Agriculturist, Chief Animal Husbandry Officer and Chief Chemist as members, was set up some years ago to co-ordinate the research programmes of the Stations and ensure that priority is given to the more important problems requiring investigation. During the year the Committee was expanded to include the Director of Conservation and Extension and the Director of Native Agriculture. The investigations in progress do to a large extent cover the research needs of African Agriculture, but the Department of Native Agriculture feels that more attention should be given to certain problems which affect African land use more particularly. The Committee is in general agreement with this view as the accepted policy has been that this Department should cover, for reasons of economy, the research needs of both European and African agriculture.

Advisory Work. While the main function of a research station is to carry out research, a great deal of the time of the staff of the various Stations is taken up with specialist advisory tours with officers of the Department of Conservation and Extension and to a lesser extent, the Department of Native Agriculture. A number of short courses also were arranged at Stations for Conservation and Extension Officers. Well-attended Farmers' Days were held at the Stations and an increasing number of individual visits from interested farmers and visitors was a further call on the time of the staff.

Departmental Conference. For the first time a departmental Conference was held and attended by all the professional officers in the Department as well

as by senior officers of other interested departments. The work of each Branch and Station was reviewed and discussed. It is planned to hold a similar conference each year, the aim being to obtain a co-ordinated picture of the entire farming industry, together with all its problems. This will stimulate team work and further strengthen the services provided by the Department.

Agro-economic Survey. Mention of this survey was made in previous reports. The field work was completed during the year and the mass of information is now being compiled into a report which will cover the whole Colony. It is hoped that this will be completed in the near future, but publication may be delayed owing to difficulties being experienced in the preparation of the maps, which will be an essential feature as much of the information can best, or only, be presented in this way.

Overseas visits. Advantage was taken of the technical assistance scheme of the United States Foreign Operations Administration for three officers in the Department to visit America on study tours connected with their official duties. The visits have proved of very great benefit to the work of the Department and it is felt that greater advantage should be taken of this generous scheme. Apart from the knowledge gained, the training and stimulation derived from such visits are especially valuable owing to the relatively isolated conditions under which research workers are placed in this country. International collaboration in the scientific field has developed greatly since the war. The Department is strongly in favour of taking advantage of this policy, particularly in regard to African territories, and during the year was represented at the following conferences:—

1. Sixth Commonwealth Entomological Conference, London, July, 1954.
2. Fifth Commonwealth Mycological Conference, London, July, 1954.
3. Meeting of the Organization for European Economic Co-operation, London, July 1954.
4. Fifth Conference of the International Society of Soil Science, Leopoldville, August 1954.
5. Second Inter-African Soils Conference, Leopoldville, August, 1954.
6. Meeting of the International Scientific Committee for Trypanosomiasis Research, Pretoria, September 1954.
7. Hybrid Maize Conference, Potchefstroom, September 1954.
8. International Horticultural Conference, Holland, August 1954.

In addition to attending these conferences a number of visits were made to the Union of South Africa to study particular problems in agriculture.

Committees and Boards. With Federation and the rapid expansion of the agricultural industry, numerous departmental and inter-departmental Committees have been set up, and take up a considerable amount of time of the senior members of the Department. The Federal Standing Committee on Agricultural Production, with representatives of all four Governments and the Acting Director fulfilling the duties of Chairman, held its first meeting during the year. The Committee, in order to gain a thorough appreciation of the agriculture of the Federation, agreed at the start, to have monthly meetings, together with a planned tour, in each of the three Territories in turn. The main function of the Committee is to formulate an agricultural policy for the Federation as a whole. Such a policy, if accepted, should play an important part in the development of the farming industry.

The details of the work accomplished by the various Branches and Research Stations in the Department follows:—

ANIMAL HUSBANDRY

The year under review was a favourable one for cattle production. Rainfall was adequate in even the drier areas, and well distributed. Cattle maintained fairly good condition during the dry season.

The Cattle Industry

Below are given figures for the European-owned livestock over the last five years:—

Year	*Total Number*	*Number of Cows*	*Number of Calves*	*Total Deaths*
1950	1,148,712	392,960	166,572	87,123
1951	1,154,860	377,673	178,088	56,055
1952	1,199,576	400,918	188,825	54,715
1953	1,196,570	411,829	192,778	62,486
1954	1,227,066	430,071	207,196	57,251

A slight increase was recorded in European-owned cattle at the end of 1954. Breeding cows and calves again showed an encouraging increase. Deaths

remained at a low level but no improvement took place in the overall reproduction rate.

Low calving rates remain the major problem in the cattle industry and additional work has been planned to investigate the causes of this important problem.

Supplies of Slaughter Stock. The following table indicates the supplies of slaughter stock and the average cold dressed weight of cattle over the past five years.

Year	*Total Number of Cattle Slaughtered*	*Average c.d.w.*
1950	200,458	415
1951	234,105	415
1952	238,944	413
1953	227,923	423
1954	256,271	423

A substantial increase took place in the total number of cattle slaughtered during 1954, which could possibly be attributed mainly to the cumulative effect of a series of good years. During the flush season of 1955 a certain amount of beef was exported in order to remove a seasonal surplus and prevent the freezing of choice grades, which have proved to be less acceptable during the off-season. Beef rationing had to be introduced in August of the year under review as a result of a serious fall in supplies to the Cold Storage Commission.

Prices of Slaughter Stock. No increase in the price of slaughter stock was made during the year. A firm agreement on prices was reached accepting the present price as basic with a 5-year guarantee and price movements according to cost of production. Seasonal price variations were placed on a weekly instead of a monthly basis to prevent the congestion of bookings caused by monthly price changes.

Grading of Beef for Local Consumption. Grading of beef and pigs was carried out at Bulawayo, Salisbury, Umtali, Fort Victoria, Gwelo and Gatooma and the number of cattle in the various grades and classes were as follows:—

Grade	Oxen	Cows	Bulls	Tollies	Calves	Total 1955	Total 1954
Rhodesia Best	3,653	146	—	—	—	3,799	3,243
Imperial . .	12,386	320	—	—	—	12,706	17,525
Standard A .	45,008	1,972	—	—	—	46,980	41,995
G.A.Q. . .	31,277	19,160	—	—	—	50,437	46,091
F.A.Q. . .	10,908	7,677	—	—	—	18,585	18,093
Compound .	12,654	10,616	1,945	—	—	25,215	27,063
Inferior . .	2,685	6,612	341	—	—	9,638	10,113
Tollies . .	—	—	—	—	—	—	132
Calves . .	—	—	—	—	6,929	6,929	2,908
TOTALS (1955)	118,571	46,503	2,286	—	6,929	174,289	167,163
TOTALS (1954)	117,914	43,025	3,184	132	2,908	—	—

For comparative purposes the numbers in the various grades obtained in 1954 are also given. This indicates a further increase in Rhodesia Best with a considerable drop in Imperials, which may have been caused by the feeding of smaller numbers and younger cattle.

No changes were made in retail grades to consumers. It became evident during the year and more particularly during the rationing period that the present unrealistic retail system of both grades and prices has a very undesirable effect on the cattle industry. This system places high relative prices on the poorer cuts of beef, which in turn is reflected in relatively high prices for medium and low grades of cattle on the open market. This situation has resulted in a very detrimental effect on the accepted policy of orderly marketing and has created serious dissatisfaction amongst many producers of beef. It has also caused a number of complaints against grading which, on investigation, revealed dissatisfaction with prices paid for the different grades rather than with the grading system itself.

Stall Feeding. A considerable decrease has taken place in stall feeding of cattle. Producers generally were of the opinion that the financial returns involved were not sufficiently attractive and consequently reduced their operations in connection with the fattening of steers. Stall feeding can contribute very materially in overcoming the severe seasonal shortage of beef, but only if it can be expanded considerably.

Cattle Slaughter Control. Records of immature steers and suitable breeding heifers slaughtered at the main centres, indicated that the numbers killed were small and did not constitute any threat to the industry.

Dairying. The dairy industry experienced difficulties due to the production of a surplus of whole milk.

The demand for dairy stock remained firm and far in excess of the quota allowed by the Union.

Pigs

The following table gives the number of pigs owned and slaughtered over the past five years:—

Year	*Pigs Owned*	*Pigs Slaughtered*
1950	43,258	54,068
1951	48,987	62,908
1952	64,015	77,968
1953	74,113	106,088
1954	64,090	121,212

The European-owned pig population showed a considerable decrease in numbers at the end of 1954. This resulted in a serious decrease in pig production as reflected by figures for slaughterings at the grading centres during the present year given below (under grading).

Grading of Pigs. A total number of 95,895 pigs were graded during the year at all grading centres, divided into the following grades and classes:—

Baconers	Numbers	Porkers	Numbers	Larders	Numbers
Grade A	27,239	Grade A	26,538	Grade A	2,953
A2	3,015	B	3,454	X	654
B	5,136	X	15,214		
C	1,592	Inferior	7,916		
X	2,094				
TOTALS	39,166		53,122		3,607

A serious drop in pigs slaughtered at the different grading centres from 117,151 to 95,895 was recorded. Baconers decreased from 47,118 to 39,166 and porkers from 64,711 to 53,122. This is a true reflection of the difficult period through which the pig industry has been passing.

During the year discussions between the different interested parties in the pig industry led to a greater measure of agreement on future policy. As a result it was possible to review the grading system and price structure. The following changes in grades and prices were accepted and scheduled to come into operation on 1st October, 1955. In order to make the price system more elastic, minimum as well as maximum prices were fixed for the different grades.

Grade	*Minumum Price per lb. c.d.w.*	*Maximum Price per lb. c.d.w.*
	s. d.	s. d.
BACONERS:		
Grade A	1 9	2 0
Grade B	1 5	1 8
Grade L	1 5	1 8
Grade X	10	1 0
Inferior	6	8
PORKERS:		
1st Grade	1 7	1 10
2nd Grade	1 3	1 6
3rd Grade	11	1 0
Inferior	6	8
CUTTERS:		
Grade A	1 5	1 8
Grade L	1 1	1 4
Grade F	10	1 0
Inferior	6	8
UNDERWEIGHT PIGS:		
Good	11	1 2
Inferior	6	8
MANUFACTURING PIGS:		
Grade A	10	1 0
Inferior	6	8

In the case of bacon grades A, B, and L, a penalty was introduced of 4d. per lb. c.d.w. for soft and oily pigs and 1d. per lb. c.d.w. for pigs containing

Sheep

The following table gives the number of sheep owned and slaughtered as well as the mortality in sheep over the past five years:—

Year	*Sheep Owned*	*Sheep Slaughtered*	*Deaths*
1950	105,266	38,548	11,415
1951	116,056	49,914	10,247
1952	115,588	54,021	20,698
1953	105,970	52,308	17,444
1954	108,574	47,452	11,912

Sheep numbers showed a slight increase during the year. Research recently initiated in connection with established summer pastures and irrigated winter pastures is likely to open up new and promising avenues of mutton production which could have a stimulating effect on an expansion in the sheep industry.

General

Close co-operation was maintained with the Extension Services and numerous visits to farms were made to give guidance on specific livestock problems. An extension of these services is desirable and would be beneficial to field as well as research officers.

POULTRY

Poultry production was not adversely affected by the high rainfall season and egg production increased, though the numbers of stock were lower, indicating improved husbandry. Egg and table-bird prices have been favourable and therefore poultry farmers have experienced a profitable year.

A National Poultry Council, comprising the Rhodesia National Farmers' Union Poultry Committee with delegates from Poultry Clubs has been formed. No organized marketing scheme has come into operation though a great deal of work and discussion on this problem has been undertaken by the National Poultry Council. It would seem that as the demand for poultry products is continually increasing and prices have been satisfactory, there is no general demand for any marketing organization involving control measures, while in some quarters there is active opposition. Private enterprise is operating in the marketing, and capital has been spent on equipment and cold store facilities in the main centres.

Stocks of pulp held by the Cold Storage Commission, however, have retarded storage for 1956. These stocks should be cleared by next season.

Exports. The sale of day-old chicks in Northern African territories is growing annually.

Imports. These were mainly table poultry and day-old chicks into Northern Rhodesia from South Africa, the numbers being 129,327 and 88,992 respectively. It is hoped that the requirements can be met from within the Federation by 1956-57 and under the Trade Agreement which came into force on July 1st, permits to import will be progressively reduced over a period.

Numbers of Birds and Sale of Produce.

The number of poultry decreased in 1954 but, owing to the change in the date of compiling statistics in 1953-54, numbers are probably much the same as in 1953. Eggs sold increased but the value was £15,734 less and amounted to £265,347. The value of day-old chicks sold increased slightly to £47,363. Table birds sold increased substantially to 591,361 lb. valued at £75,818. The total value, together with the sale of breeding stock, of poultry products was £395,872, an increase of £2,864 on last year. The number of poultry producers was substantially the same as last year (3,405) but figures as usual only reflect those rendering returns to the Statistical Department.

Feeds.

Poultry feeds have been freely available and no significant price changes have taken place during the year. Price control on stock feeds was removed in July.

Gwebi Agricultural College. The Thirty-fifth Annual Egg Laying Test concluded on January 30th and a full report published in the Rhodesia Agricultural Journal March/April, 1955, issue. Good results were achieved by some breeders. One Gold and one Bronze Medal were awarded by the South African Poultry Association. The mortality was below average at six per cent.

The Thirty-sixth Annual Test, which commenced on March 1st, 1955, was enlarged to include ten pullets per team and these are housed in new pens, the individuals being trapnested.

The Station flocks of various breeds increased as new buildings have been constructed. Excellent results continue from the highly pedigreed stock which has been bred over the years. All pedigree stock was bred by artificial insemination which has enabled larger numbers of sisters to become available for family progeny testing. Results were most satisfactory, with a 95 per cent. fertility recorded. Stud cockerels and turkeys from these flocks are sold to farmers by auction and, as always, find a ready sale.

Trials. The feeding of sorghum grain to growing stock showed no significant difference between the use of maize, sorghum, or munga, when fed at a rate of 55 per cent. of the ration as meal and grain.

The provision of artificial lighting for hens in moult brought them into production earlier at eight weeks after moulting commenced, which proved very valuable for breeding stock.

General. A killing and dressing room has been constructed and also four laying houses from converted test pens. Automatic watering has been installed in permanent housing.

Eggs and table poultry were supplied to the College hostel and staff, the surplus going to the General Hospital. Total revenue, including sales of stud stock, was £2,260.

A programme of 30 lectures and practical instruction was given to junior students during the year.

Matopos Research Station. The building programme continued with the erection of a three-unit brooder house which was completed in time to be used. The flocks have been successful in the laying houses erected last year, but development will be slow until the building programme is further advanced.

All poultry extension services for Matabeleland and the Midlands were provided from this Station.

Henderson Research Station. The fish feeding trials for laying stock at this Station have proceeded well this year and some interesting results are expected when concluded. Trials with growing stock have been commenced.

Health. There has been one outbreak of Newcastle Disease in the Figtree area involving European owned poultry. The slaughter of all stock was ordered and to date the disease has not spread.

Coccidiosis still causes greater losses in chickens in spite of various drug treatments which are now available.

The B.W.D. testing service provided by the Veterinary Department continues to serve the industry well.

Veterinary import control on stock into Southern Rhodesia from the Union has been in force throughout the year for Epidemic Tremor Disease. The same restriction has been in force in respect of movement of stock from N. Rhodesia to S. Rhodesia. Removal of Customs posts at the border makes control of movement of poultry difficult. Federal control of imports on veterinary grounds appears essential.

Extension Services. Specialist poultry extension work has been carried out involving judging at Agricultural Shows and staging of exhibits. Attendance at Farmers' Poultry Clubs' and Young Farmers' Clubs' meetings and visits to individual farmers, feed manufacturers, egg dealers, etc., have been increased.

A series of articles on poultry feeding by the Poultry Officer, Matopos, has appeared in the "Rhodesian Farmer", and a bulletin on "The Production and Marketing of Table Poultry" was published in the "Rhodesia Agricultural Journal".

DAIRYING

In spite of the high rainfall in all areas, milk production was far greater than in previous seasons. The excessive precipitation adversely affected production in some cases mainly due to its effect on the health of the cattle but, on the whole, milk production was not adversely affected and the season was favourable for dairying. It is probable that the food value of forage crops was affected to some extent, but this did not have a serious effect on overall milk production during the winter.

Production of Dairy Produce.

Purchases of milk by the Dairy Marketing Board during the period 1st October, 1954, to 30th September, 1955, exceeded purchases during the previous year by approximately 1.3 million gallons—an increase of about 20 per cent. Preliminary figures for total milk production for the season indicate an overall

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increase of over 1.6 million gallons. Examination of these figures indicate very clearly that the trend of the dairy industry continues in the direction of the disposal of whole milk off farms. Butter production also exceeded that of the previous season by about 20 per cent. but this increase was due to the separation of milk purchased by the Dairy Marketing Board which was surplus to whole milk requirements and cheesemaking facilities. Butterfat supplies from farmers in the form of cream were substantially the same as for the previous season. Cheese production increased considerably due to the increased intake of milk by the Dairy Marketing Board and the manufacture of milk surplus to whole milk requirements into cheese.

One notable exception to the increased milk supplies in all areas was Chipinga where, owing to the dry conditions during the previous season and the late onset of rains in this season, milk supplies to the Gazaland Co-operative Cheese Factory were down by about 30 per cent. as compared with the previous year.

The figures given in the following table for milk, butter and cheese production illustrate the rapid growth of the industry and the continuation of the general trend towards sale of whole milk off farms.

TABLE I

DAIRY PRODUCTION, 1951 TO 1955

Year	*Butter* (1,000 *lb.*)	*Cheese* (1,000 *lb.*)	*Liquid Milk* (i) (1,000 *galls.*)	*Total Gallons*
1951/52 . . .	975	490	6,730	10,390,000
1952/53 . . .	964	578	7,350	11,070,000
1953/54 . . .	906	1,007	7,590	11,670,000
(a) 1954/55 . . .	1,096	1,267	8,500	13,300,000

(a) Preliminary figures.

(i) Milk available for use as fresh milk, fresh cream and ice cream.

A further illustration of the trend of development of the industry is given by the following table showing numbers of suppliers and intake into the main centres during the last 5 years:—

TABLE II

Year	*Number of Suppliers*	*Total Milk Supplied* galls.
1950/51	204	4,512,000
1951/52	245	5,235,000
1952/53	280	5,638,000
1953/54	322	6,488,000
1954/55	364	7,808,000

Creameries, Butter Production and Consumption.

The new Dairy Marketing Board Dairy at Gwelo was registered as a creamery and the registration of the Dairy Marketing Board Creamery at Bulawayo was cancelled in June, 1955. Thereafter the Gwelo Dairy was the only creamery operating in Matabeleland.

Production of creamery butter increased by about 20 per cent. due to the separation of whole milk by the Dairy Marketing Board dairies and its agents. This was milk surplus to fresh milk requirements and cheesemaking facilities. This increase in production did not alter the position appreciably and local production was only sufficient to meet just over 30 per cent. of the demand. Butter consumption increased by about 8 per cent. and it is clear that unless there is a change in the general trend of the industry there is no prospect of reducing the quantity of butter imported.

Exports of butter mainly to P.E.A. were 83,000 lb. as compared with 79,000 lb. for the previous year and imports at 2,619,000 lb. were about 200,000 lb. more than for the previous year. In spite of increased consumption the stock at the end was about 150,000 lb. more than at the beginning of the season.

Butter fat prices paid by creameries remained the same as for the previous year, but the wholesale and retail prices of first and second grade creamery butter were reduced by 1d. per lb. at the end of January, 1955. There is no price control on third and below grade butter.

The quality of the butter manufactured was significantly better than for the previous four seasons but this is to be expected as all cream supplied to creameries from surplus whole milk was supplied fresh and should have been first grade. All imported butter and nearly all locally manufactured butter was check graded before sale and degradings were negligible, while the quality of the butter within the grades was substantially the same as in previous seasons.

Butter was imported from three countries in the following proportions:—

N. Zealand	...	46 per cent.
Kenya	...	28 per cent.
South Africa	...	26 per cent.

Cheese Factories, Cheese Production and Consumption.

Three new cheese factories came into operation during the year and these plus one other factory which had been operating under temporary permission, were registered in addition to three factories which had been registered for the previous season. At the end of the season cheese was being manufactured at six factories.

Cheese manufacture increased still further and reached a total of over 1¼ million lb. No Cheddar or Gouda cheese was imported during the year as local production was sufficient to meet the demand. The only farm cheesemaker manufacturing Cheddar cheese produced about 0.5 per cent. of the total Cheddar cheese made, while other farm cheesemakers, making unspecified types of cheese, produced 1.4 per cent. of the total cheese manufactured.

As the Gazaland Co-operative Cheese Factory, Chipinga, produced about 30 per cent. less cheese than during the previous season, it is evident that the increase in cheese production is due to the increased quantity of milk purchased by the Dairy Marketing Board and the consequent manufacture of surplus milk into cheese.

There was a significant improvement in the general quality of the cheese manufactured and the percentage of first grade cheese produced was higher than it has been for the last four years. In spite of the increase in percentage of first grade cheese there is no room for complacency as the quality of some of the cheese within this grade was not as high as it should be.

The Dairy Marketing Board Dairy at Gatooma started the manufacture of Roquefort cheese in June, 1955. Some of the cheese manufactured at first was of indifferent quality, but the general quality has improved although the cheese manufactured may be somewhat firmer than the imported article from South Africa.

A subsidy of 6d. per lb. was paid on all cheese manufactured by the Gazaland Co-operative Cheese Factory and the one farmhouse cheesemaker who makes Cheddar cheese.

Control prices on 1st and 2nd grade Cheddar and Gouda cheese remained unaltered during the year.

Milk and Cream Supplies.

There was a considerable increase in the volume of milk purchased by the Dairy Marketing Board and in spite of increasing consumption of milk as whole milk, a surplus over whole milk sales was manufactured into cheese in every month. The increase in milk supplies, cheese production and fresh milk sales in the main centres of population is illustrated in the following table:—

TABLE III

Year	*Milk Purchased* (1,000 *galls.*)	*Surplus Milk Manufactured into Cheese* (1,000 *galls.*)	*Apparent Consumption as Whole Milk and Cream* (1,000 *galls.*)
1951/52	5,235	249	4,986
1952/53	5,638	441	5,197
1953/54	6,488	1,026	5,462
1954/55 (*a*) . . .	7,808	1,876 (*b*)	5,932

(*a*) Preliminary figures.

(*b*) Includes approximately 500,000 gallons of milk, surplus to cheesemaking facilities, which was separated.

The figures given do not include milk sold by producer-retailers in these areas.

The price of milk to consumers remained unaltered during the season, but a special order was made in August, 1955, authorizing the Board to sell milk delivered to schools, in one-third pint bottles, at a price not exceeding 3d. per bottle. It is hoped that a milk in schools scheme can be introduced in 1956.

There was no change in the price paid to producers for milk delivered to the Dairy Marketing Board. Three seasonal prices and the scheme whereby milk is purchased on a quality basis, continued to operate as before. All sampling and testing and the calculations of the monthly pay-out per gallon for each producer were carried out by Dairy Officers. This work entailed the sampling and testing

of over 8,500 consignments of milk and the calculations necessary to ascertain about 4,300 pay-out figures.

The increasing number of producers supplying milk under the Dairy Marketing Scheme increases the work devolving upon the Dairy Branch. In addition to the tests mentioned in the previous paragraph, numerous advisory tests were carried out in order to correct faults in milk production technique and to assist farmers in maintaining the supply of good quality milk. The annual improvement in the general quality of milk is illustrated by the increase in the average quality bonus earned, which in this season amounted to over 1d. per gallon.

Some experimental consignments of pasteurized milk were sent from Salisbury to Lusaka in an insulated tanker. These experiments were successful and it is evident that milk can be transferred in this way and arrive in a very satisfactory condition in N. Rhodesia.

Fresh Cream and Other Dairy Products.

Although no accurate figures are available it is evident that sales of fresh cream have increased probably due to regular availability of supplies.

No other dairy product such as condensed and powdered milk was produced, but in view of the increase in cheese production the manufacture of other dairy products should be considered. It is probable that the production of sterilized milk will have to be undertaken in the near future.

Dairy Bonus Scheme.

Final figures are not available, but indications are that about £6,000 will be paid out under this Scheme for the year.

Milk Recording.

Shortage of staff continues to impede the progress of the Milk Recording Scheme. The post of Dairy Officer to take charge of this scheme and establish a Bureau of Milk Records has not yet been filled. Two additional Milk Recorders were appointed and this enabled the expansion of the Scheme to include all herds on the waiting list. Owing to the increase in the office work, due mainly to the expansion of milk recording, it has not been possible to make up as much leeway with the compilation of annual statistics as was anticipated in the last report, but most of the figures for the 1952/53 season were completed. Results for that year show that herd averages were lower than for the previous year, but it would be premature to accept this as an indication of a general lowering of milk production in the recorded herds.

General.

The dairy industry continues to grow and while cream supplies to creameries from farms remain almost static, with perhaps a small decline, milk supplies to the main consuming centres where the Dairy Marketing Board operates, are increasing rapidly. Whole milk consumption is also increasing and although this consumption is not increasing as rapidly as production, any violent set back to production could have a very serious affect in a few years. The stability given to the industry by the purchase of milk by a central body, initially the Milk Marketing Committee and then by the Dairy Marketing Board, has been largely responsible for the considerable increase in production.

The Dairy Marketing Board completed the alterations to its dairies at Que Que and Gatooma and completed the building of the new Gwelo and Umtali dairies during the year. It has, therefore, been a year of achievement for the Board and although there are still many difficulties to be overcome, the first phase of the Board's activity has been completed. The next most important project to be undertaken is the building of a new dairy in Salisbury. This will have to be undertaken without delay if serious difficulties are not to be encountered in endeavouring to supply the increasing demand for milk through the present dairy with its inadequate facilities.

Cheesemaking facilities were inadequate to convert all the surplus milk into cheese during the season and in spite of the opening of the new dairies at Gwelo and Umtali a similar difficulty, but to a lesser extent, is likely to arise in Salisbury and possibly Bulawayo, during the coming season. Production of Cheddar and Gouda cheese during the 1954/55 season was sufficient to meet the demand and although consumption is increasing and there may be an outlet for some cheese in the remainder of the Federation, serious consideration should be given to the manufacture of other milk products such as condensed and powdered milk which are now imported in large quantities.

Production of butter is unlikely to increase and, as consumption is increasing, a progressively greater quantity of butter will have to be imported to meet the demand. This position could be altered if such use could be made of skim milk

that it would become economic for milk from the whole milk pool to be separated and the butterfat used for butter production.

Although it has not been possible to analyse all the results of the tests carried out under the scheme for the payment for milk on a quality basis, it is very evident that this scheme has been very effective in improving the quality of milk supplies. Some preliminary analyses show that there is definite overall improvement in the quality of milk and that general management of dairy herds and methods of milk production are improving. This is illustrated by the average annual payments made to producers for milk supplied to the Dairy Marketing Board which show that the average bonus for quality earned is increasing annually and in the 1954/55 season was over 1d. per gallon. This is encouraging but it is also evident that further improvements in efficiency are required. To this end the importance of milk recording cannot be over-estimated and in order to make full use of the Milk Recording Scheme efficient analyses of records are essential.

The Branch has operated under serious difficulties during the year owing to difficulty in finding suitably qualified men to fill the vacant posts for Dairy Officers. The work of the Branch is increasing annually and certain investigational work should be undertaken, but during this year essential services have only been maintained by virtue of the fact that all Officers have willingly co-operated in working long hours to maintain these services. A sad loss to the Branch and the dairy Industry in general was the death of Mr. F. A. Lammas, Senior Dairy Officer, in November, 1954, after 25 years of efficient and loyal service.

FIELD HUSBANDRY

Seasonal Conditions.

The 1954/55 rainfall season in Southern Rhodesia was remarkable for the very heavy and widespread rain in December. Some stations recorded 5 times the normal rainfall and with fairly good rains occurring in the following months, the season closed with totals well above normal in nearly all areas. A few places had less than 5" above normal but a large number exceeded 20" above normal.

On the whole the season may be said to have been a good one, but in some respects too much rain fell in December. The ground soon became saturated, with consequent heavy run-off in almost every wet spell.

The Maize Crop

Estimate of Yields.

The final estimate of the European grown crop of maize is that 2,700,000 bags net will be produced from 400,000 acres, which gives an average yield of 6.75 bags per acre for the whole Colony. Of this total, Mashonaland is expected to produce 2,482,000 bags from 332,000 acres, which gives an average yield of 7.5 bags per acre, compared with a total of 2,403,887 bags from 297,120 acres, giving an average yield of 8.09 bags per acre for the 1953/54 season. The average yields of 6.75 and 7.5 bags per acre for the whole Colony and Mashonaland respectively are lower than the record average yields for the previous season. This drop in yield can be attributed to excessive rains and a severe attack of Blight *(Helminthosporium turcicum).*

The Maize Belt consisting of the Mazoe, Salisbury, Hartley and Lomagundi districts is expected to produce almost 71 per cent. of the Colony's total maize crop, or some 1,906,000 bags from 220,000 acres, which is only 55 per cent. of the total acreage under maize. The average yield in these districts is expected to amount to 8.68 bags per acre or 1.93 bags per acre more than the average for the country.

It is anticipated that the 1954/55 crop will supply all the Colony's requirements and that there will be an appreciable surplus for carry over to the following season.

Maize Grazing and Moisture Testing.

Only a very few samples were submitted for moisture tests during the past season. The Grain Marketing Board with its better facilities now does practically all these tests.

Southern Rhodesia Seed Maize Association

The Southern Rhodesia Seed Maize Association and Government continue to employ two full-time Inspectors. The Association pays two-thirds of the Inspectors' salaries and Government contributes one-third plus the travelling expenses.

Final Report for the 1953/54 Season.

The 1953/54 season was the sixth since the commencement of growing hybrid maize. Approximately 3,580 acres were sown for the production of seed for sale. This acreage exceeds the 1952/53 season acreage by 467 acres.

Some 25,000 bags of seed were produced: of this quantity 19,400 were required for the local market. The anticipated overseas market did not materialize and so the remainder of seed was sold as commercial maize. Seed for sale was produced by 47 members of the Association.

Hybrid Maize for Natives.

During the three previous seasons the Department of Native Agriculture has purchased between £8,000 and £10,000 worth of hybrid maize seed each year. The Department this year has purchased 4,500 pockets of 100 lb. each. This represents 2,250 bags of 200 lb. net so that the amount of £12,375 has been expended on hybrid seed. This is a considerable increase on the amount of £8,000 expended last year, but it is felt that a larger sum could be expended with benefit to the hybrid maize seed industry and also to the Native growers themselves, as the following figures of increased yields, obtained when hybrid maize is grown show very clearly:—

Season 1954/55	Hybrid Maize		Other Maize	
	Acres	Yield per acre bags	Acres	Yield per acre bags
Mazoe	56,132	10·13	5,969	8·33
Salisbury	39,833	9·86	7,723	6·30
Hartley	33,155	9·39	17,594	7·43
Lomagundi	31,073	11·64	13,154	7·39
Gwelo	10,698	6·33	19,424	4·04
Insiza	2,876	6·32	4,457	4·36
Totals	237,515	8·92	122,194	5·16
Native Areas (1951/52)	—	7·58	—	4·48

Interim Report for the Season 1954/55. Single hybrid seed issued to members was sufficient to sow 3,359 acres. This includes 204 acres by growers who are growing solely for their own use, and 346 acres either voluntarily left unsown or disqualified. The total acreage is 800 less than last year. There were 50 members producing seed for sale as compared with 48 the previous year.

Grading. There has been a definite improvement in the grading of the seed, although there are still a few members whose tests have indicated that they have to regrade before their seed will reach the standard required. The present system of sending in samples of seed for the grading test, and a part of each sample being used for the germination test, is working satisfactorily.

Quality of Seed. Fifty members have sent in seed to the Agents for sale and the high quality of the seed produced by the majority of growers reflects the favourable weather conditions which prevailed during the growing season. With few exceptions every grower's seed was plump, and a large majority of the tests showed the germination percentage to be 98 or over.

Delivery of Seed. Deliveries of seed commenced earlier than in previous years. The supply of railway trucks has been more plentiful and the Association's Agents have been able to keep their floors reasonably clear in spite of there being less floor space for use.

Deliveries until October 22nd, 1955, were 37,143 pockets and sales had reached 33,806 pockets. Fifteen members were unable to reach their allotted quota.

Five members have marketed open-pollinated seed, the total number of bags being 475, including the varieties Hickory King, Southern Cross and Salisbury White.

Applications for Single Hybrid Seed for Next Season's Crop. Fifty-six members have applied for single hybrid seed for the production of seed for sale during the forthcoming season. The seed issued is sufficient for sowing 3,250 acres which is 100 acres more than last year. Eighteen members are growing for their own use on a total of 209 acres. This is an increase of 5 acres only over last year's total.

Sales to the United Kingdom. Nine tons of seed have recently been exported to the United Kingdom, and it is possible that a further 10 tons will be ordered. This quantity compares very unfavourably with the 406 tons sold from the 1952/53 crop. It does not appear likely, however, that there will be any large export

market for hybrid seed as European countries are devoting much work to breeding varieties specifically adapted to their own climatic conditions.

Membership of the Association. The following table gives a comparison between the 1954/55 seasons and previous seasons:—

Season	Total Membership	Producing Hybrid Seed	Total Acreage Grown	Seed Available for Sale in Bags of 200 lb.
1948–49	57	40	350	1,774
1949–50	77	65	3,150	13,367
1950–51	91	69	3,275	17,226
1951–52	100	77	3,500	20,800
1952–53	96	80	3,113	20,500
1953–54	94	70	3,580	25,500
1954–55	90	68	2,765	25,000

Hybrid Maize Farm. Efforts to secure a suitable farm for the production of single hybrid and the bulking of inbred seed have continued, but so far without success. The need is becoming more urgent.

Seed Maize Prices. There has been no change in the prices for seed maize during the present season which remain as follows:—

Certified Double Hybrid Seed—Large Flats and Medium Flats	£5 10s.	0d. per bag of 200 lb. nett
Certified Double Hybrid Seed—Large rounds	£3 10s.	0d. per bag of 200 lb. nett
Certified Double Hybrid Seed—Small rounds	£3 5s.	0d. per bag of 200 lb. nett
Certified Open-pollinated Seed	£4 0s.	0d. per bag of 200 lb. nett
Standard Open-pollinated Seed	£3 0s.	0d. per bag of 200 lb. nett

Wheat Production

Summer Wheat. No seed was distributed to farmers for growing wheat during the summer of 1954/55 as it was considered that the previous three years' trials had served to indicate that considerably more investigations would be required and better varieties produced before summer wheat growing could become a feasible proposition.

Trial plots of wheat, embracing fertilizer and spraying trials for weed control, continue to be grown on various Government Research Stations. On the Agricultural Experiment Station, Salisbury, a large number of different varieties were grown from which selections were made.

Winter Wheat. The winter wheat crop amounted to 12,015 bags. Of this amount 10,738 bags were grown under irrigation, and 1,279 bags were grown on moisture retaining vleis. The above crop is some 4,000 bags more than the total production of both summer and winter wheat during the 1953 season, but still represents only a fraction of the Colony's requirements.

Wheat Plant Breeder. With the appointment of a Wheat Plant Breeder, who has recently assumed duty, wheat breeding investigations will be resumed after a break of over nine years. The main lines of investigation will be to breed for rust resistance, higher yielding ability, and stronger straw. There will be both a summer and winter breeding programme.

Sorghum Production

Owing to the continuation of a series of good rainy seasons, sorghum production has remained at approximately the same level for the past three or four years.

Feeding Trials. In last year's Report, mention was made that arrangements had been made with the Pig Industry Board to conduct pig feeding trials with recommended named and commercially pure varieties of grain sorghum, in order to assess its true merits as a feed; sorghum had fallen into disfavour owing to the very poor quality of grain which found its way into trade channels for stock feed.

It is very pleasing to report that some varieties of grain sorghum, notably Early Hegari, have given excellent results in these trials. Fortunately, Early Hegari is one of the best yielding and adapted varieties. Arrangements will be made to feed other varieties, such as the Sooner Milos if a sufficient quantity can be obtained.

Southern Rhodesia Seed Potato Asssociation

Eastern Growers' Association. The recommended potato scheme as described in last year's report has completed one growing season. Some 2,000 bags of seed were passed by the Inspectors.

Two or more field inspections and one tuber inspection were made and the quality of seed and resultant crops were very high indeed.

It has been decided to continue the recommended scheme for the coming season and the position will be reviewed and the question of the introduction of a fully certified scheme will be discussed at a later date.

Salisbury Area Potato Growers' Association. A meeting of potato growers in the Salisbury area has recently been held to discuss the formation of a local association. Much could be done to improve the quality of seed for sale by the formation of such an Association.

Miscellaneous Crops

Green Manure Crops. Legume green manure crops still continue to prove their worth and the demand for seed is as great as ever. Unfortunately the two best crops, namely sunnhemp and velvet bean, suffer from a number of pests and diseases and there is a great need to find suitable substitute green manure crops. Various legume crops have been imported and tried out. Some show fair promise but none appear to produce sufficient bulk of green matter. Various mixtures of legumes and non-legumes are recommended to farmers who are also advised to rotate their green manure crops and not plant the same legume crop year after year.

Dwarf Castor Bean. As reported last year, the interest which has been aroused in this crop has continued during the past season. A few growers have planted between 20 and 30 acres and have stated that larger acreages will be planted this year. A decorticating plant has been erected at Hartley; it is hoped that a sufficiently attractive price will be offered to encourage another cash crop in arable rotations.

Salisbury Experiment Station

The rainfall for the season from October 1st until April 30th was 39.48 inches, more than eight inches above the mean for the last 32 seasons. Until almost the middle of February the season was too wet for optimum growth; from then onwards more sunshine and adequate rain improved conditions and the yields of most crops were average or above average. The long spells of wet weather were, unfortunately, very favourable for the development of certain diseases, and exceptionally severe attacks of Late Blight in potatoes and Blight *(Helminthosporium turcicum)* in maize occurred.

Maize Breeding Investigations. The most urgent consideration in the maize breeding programme is the necessity for improving the resistance to *Helminthosporium* of the hybrids being put into commercial production. A series of seasons in which weather conditions have been favourable for the development of this disease has shown that it can seriously limit yields when susceptible varieties are grown. Also, no doubt, a sequence of favourable seasons has built up infection by the carry-over of infected trash and plant residues from one season to another. In this connection, it was observed, in the stubble mulch trial, that the use of infected residues as a mulch acted as an ideal reservoir of infection for the following maize crop; the stubble mulch plots were the first to develop the disease. A spray trial conducted on the station, in co-operation with the Plant Pathology Branch indicated that a severe infection of *Helminthosporium* may reduce the grain yield by as much as 30 per cent.

The problem is being tackled in two ways. An attempt will be made to transfer the resistance character, from known sources of resistance, to susceptible lines with exceptional combining ability; and secondly, the search for new resistant lines from adapted local open pollinated varieties, is being extended as far as the limited staff will permit. Introductions are also being obtained from other countries which grow maize under reasonably similar climatic conditions.

Maize Yield Trials. Four yield trials were carried out on the Station. The mean yield of all the hybrids tested in these trials was 27.8 bags per acre, the comparable figure for the open-pollinated varieties being 20.2.

Nitrogen Relationships. This season was the concluding year for the trial conducted to investigate the relationship between the nitrogen in the soil and the protein in the grain. The open-pollinated variety, Hickory King, and the single hybrid N3-1-4-9 x A5-7-6- were compared for yield and for the protein percentage of the grain at three nitrogen levels. This trial has shown clearly that the lower protein content in the grain of a high yielding variety, such as the hybrid

N3-1-4-9 x A5-7-6 may be due to the low nitrogen content of the soil and not to any genetical inferiority. Provided there is sufficient nitrogen, the hybrid has proved capable in this trial of producing considerably heavier yields of grain with a protein content equal to that of Hickory King. Mean yields and protein percentages for the three seasons 1952/53, 1953/54, 1954/55 are given in the following table:—

YIELD OF GRAIN (in bags per acre) AND PROTEIN PERCENTAGE

	Hickory King			Hybrid N3–1–4–9 x A5–7–6		
	0 N/S	300 N/S	600 N/S	0 N/S	300 N/S	600 N/S
Mean Yield . . .	14·36	19·54	21·70	19·92	23·82	27·20
Mean Protein % . .	8·0	8·1	8·8	7·5	8·1	9·0

N/S=Nitrate of Soda.

Removal of Different Parts of the Maize Plant. The trial to determine the effect on the yield of grain of the removal of various parts of the maize plant gave larger and more striking differences than in previous years. This is attributed to the attack of *Helminthosporium* which was recently more severe than in previous trials. The normal pattern of infection with this disease is such that the lower leaves are attacked first and eventually are the most heavily infected. The effect of removing the upper leaves is likely to prove most serious therefore when the efficiency of the lower leaves has been reduced by disease. The percentage of plants bearing suckers was so low that it was decided that desuckering was unlikely to have a significant effect, and this treatment was excluded. The results of the experiment are given in the following table:—

YIELDS OF GRAIN
(in bags per acre)

Season	Treatment			
	A	B	C	D
1954–55	29·73	26·76	22·99	26·46
Mean of Seasons 1951–55 . . .	26·27	24·54	20·89	24·01

A=Control.
B=Tassels + 3 top leaves removed at detasselling time.
C=Stalks cut above ears 15 weeks after planting.
D=Stalks cut above ears 18 weeks after planting.

Thus in every way the cutting of the plants above the ear for ensilage is an unsatisfactory practice. Although the eye may not be able to measure the reduction in yield, it is very considerable nevertheless. Silage made from maize tops and therefore without ears, is of inferior quality.

Fertilizer Trials. In the main fertilizer trials only nitrogen gave significant increases in yield. In one trial 400 lb. of Superphosphate gave a significant increase of 1.7 bags per acre, but a similar dressing in a second trial gave no increase at all. It was not to be expected, therefore, that the method of application would have any effect. The response to 50 lb. of N. (250 lb. Sulphate of Ammonia) applied as a top dressing six weeks after planting, was just over 8 bags an acre, and to 100 lb. of N. just under 10 bags.

Potatoes. Twenty-two varieties were included in this season's yield trial. The American variety Kennebec gave the highest yield of 117 bags to the acre. The two Dutch varieties, Furore and Gineke, both yielded over 100 bags per acre, but Pentland Ace yielded 96 bags to the acre. With the latter variety there is a considerable variation in the yield from individual plants; this may be responsible for the rather disappointing yield. Two samples of Up-to-Date, a variety very susceptible to Late Blight, each yielded 44 bags to the acre.

Soya Beans. The heavy rains in December, January and early February proved excessive even for soya beans, but the crop grew out well in March and the average yield in the variety trial was $8\frac{3}{4}$ bags of seed to the acre. Once again Hernon 147 gave the highest yield—over $10\frac{1}{2}$ bags to the acre. A number of introductions from Angola, the most promising of which were included in the trials, gave yields as high as the Hernon strains.

Velvet Beans. In the variety trial in which the crop was harvested for seed, yields in general were the heaviest since the season 1949-50. The following are the yields of seed and hay of the varieties on trial:—

	5	11	14	16	18	42	52	77	J.74	SOM
Weight of seed in bags per acre .	14·45	14·08	11·57	12·59	12·02	12·23	7·78	7·88	7·34	9·70
Weight of hay in tons per acre .	1·91	1·72	1·93	2·04	1·92	2·00	1·09	1·51	1·43	1·16

Sunn Hemp. Three separate manurial trials were conducted on sunn hemp planted on 24th December to measure the effect of phosphates, potash and lime on the growth of the crop. The growth was measured as a green weight taken towards the end of March. The sunn hemp grew reasonably well but there was only a small response to phosphates, potash or lime.

Groundnuts. The three varieties, Virginia Bunch, Valencia (Spanish Bunch) and Indian Coromandel outyielded all others. The crop did not respond to applications of phosphates, potash or lime.

Stubble Mulching. In the 1953/54 season a block of land was planted to maize, and at harvesting was divided into plots to allow for the testing of a number of methods of utilizing the stover. In the season under review, all plots were replanted to maize to measure the effect of the stover treatments. The following were the treatments:—

A=Control, all stalks removed.

B=Stalks ploughed under.

C=Stalks stubble mulched.

D=Stalks all removed and 2 tons of kraal compost applied to land.

500 lb. of sulphate of ammonia was applied to all plots although three methods of application were superimposed on each stalk treatment.

The mean yields of the four stalk treatments were A=28.98 B=29.93 C=26.84 D=32.44 bags per acre.

It must be emphasized that these figures are only for one season, and it may not be possible to gauge the true effect of incorporating the stover in the soil until the practice has been in use for several years. It may well be that the lower yield in the stubble mulch plots was partly due to the earlier development of blight. With the development and use of resistant hybrids susceptibility to blight will no longer be a factor influencing the results from stubble mulching; but it is felt that this year's yields indicate that a fuller knowledge of mulching is essential before the practice can be advocated.

General

No hybrid Maize Conference was held during the year, but it is expected that in its stead a tour will be made of all maize breeding stations in the Union in February or early March next year.

Agricultural Shows. The Chief Agriculturist judged the maize, agricultural produce and district exhibit sections at Umtali, Salisbury, Bulawayo, Gatooma and Fort Victoria Shows. Apart from the maize exhibits at the Salisbury Show, which were good, other exhibits at all shows were disappointing.

HORTICULTURE

The horticultural industry has had a year of steady progress, but considerably greater production is required before self-sufficiency is attained. Based now on Federal returns, imports of raw horticultural produce totalled £574,700 in value during 1954. This is almost double the previous year's imports for Southern Rhodesia. A new factory for the processing of fruit and vegetables is to commence operations at Cashel, and it is expected that this will be a great incentive to increased production.

Climatic Conditions. The very heavy rains again experienced throughout the country caused a considerable rise in the water-table and some losses of established fruit trees by waterlogging occurred.

Summer production of vegetables became a precarious enterprise, excessive rain and high humidity favoured the spread of diseases causing a vegetable scarcity for several months.

A very mild winter brought about a plentiful supply of seasonal vegetables which continued until the occurrence of serious late frosts in August. Much damage was caused to young sub-tropical fruit trees.

Citrus

Fruit crops on the whole were fair and no marketing problems were experienced. Orange yields were lower in the Umtali area due to frost damage during the previous year. Thrip insect-marked fruit was common. The cold weather retarded nursery citrus trees and local supplies were short.

A new nursery, mainly to propagate citrus and sub-tropical fruit trees on a large scale, commenced operations at Umtali. This should help in overcoming the serious shortage brought about by the restriction in importations from the Union of South Africa.

On the nutrition side, trees were affected by the heavy rains leaching out plant food. Poor foliation and small leaves in some groves indicated the need for increased nitrogen applications. Some difficulty was experienced on one farm where first-year-cropping orange trees had been adequately supplied with nitrogen but given no phosphates. While the fruit was attractive looking and of good texture, it was almost entirely without flavour.

Production and Sales. Declared sales of citrus for 1953/54 (including fruit utilized by the Citrus Estate for processing) were:—

	Cases of 75-85 *lb.*
Oranges	254,556
Lemons	11,836
Grape Fruit	3,357
Other	4,443
TOTAL	274,192 (last year, 289,456 cases)

The fruit was valued at £243,781 as compared with £235,661 for last year's crop.

Citrus Trees. For the year 1953/54 the number of citrus trees reported by farmers in the Colony totalled 230,786. This represents a slight decrease as compared to the previous year. Of these 148,847 were bearing trees. Orange trees accounted for nearly 80 per cent. of all citrus trees.

Deciduous Fruit

Interest in deciduous fruit growing was well maintained and considerably increased plantings of peach, plum, pears and apricot trees were made. A continued improvement in the quality, packing and presentation of this fruit was noted from several large producers.

No serious damage by hail was reported, but fruit-piercing moths attacked ripening fruit on a considerable scale, especially in the Inyanga area.

Late frost caused peach trees to shed their fruit and only light crops will result.

Trial plantings in several areas of grapes for dessert and making wine grew well and produced small crops. Preliminary results to date appear to be favourable, but a great deal of investigation is required with regard to the cultivation of grapes under local conditions.

The continuous rains during the apple harvesting months brought on more than the usual attack of sooty blotch disease on apples. This necessitated the use of the bleach bath treatment.

Deciduous Fruit Trees. The larger growers reported a total of 174,606 trees, which is 8,174 more than the previous year. As only 70,947 trees are of bearing age, a considerable increase in local fruit production should be realized in a few years' time.

Sub-tropical Fruit

Bananas. Planting of Cavendish bananas continued in the Umtali South area and from next year, when cropping commences, increasingly large supplies of local fruit should be forthcoming. Further inquiries were received for additional land with the necessary irrigation facilities for banana growing. The crop on the Sabi Valley Experiment Station shows excellent promise.

Papaws. Very good quality fruit was supplied to the Salisbury market by a specialist grower in the Shamva area. Losses of young papaw trees in some parts of the country have been heavy owing to their sensitivity to frost.

Pineapples. Locally-grown supplies were quite insufficient to supply the demand and it is considered that considerable expansion in planting could take place to supply our requirements. Excellent out-of-season fruits were grown in the Melsetter district and realized high prices.

Avocados. The difficulty of obtaining budded avocado trees curtailed plantings. A local nursery commenced propagation and obtained material for budding from the trees on the former Experiment Station, Umtali.

Guavas. With a local factory operating at Chipinga, nearby farmers found a good outlet for guavas.

Strawberries. This crop is assuming increasing importance. Three new high-yielding varieties were introduced from the Western Province Fruit Research Station, Stellenbosch, for trial. They have made promising growth.

Fruit-Fly. Infestation of ripe fruit by fruit-fly larvae was common. Without doubt this is the greatest scourge to fruit growing in this country.

Vegetables

The acreage under vegetables during 1954 was slightly higher than that of the previous season but yields were lower by 1,221 tons. This reduction in yield was due to frost damage and excessive rains.

Much of the production is still of a haphazard nature with wide fluctuations of supply. Some growers are still too prone to follow seasonal production methods rather than regular cropping programmes with a steadier price range.

Improved layouts and the efficient use of overhead irrigation have been responsible for considerably increased crop yields by a number of growers.

Land 25 miles west of Beit Bridge was opened up during the past season for vegetable growing. Water for irrigation purposes is obtained from the Limpopo River.

Vegetable Processing Factory. The proposed factory to be erected in Salisbury for the processing of vegetables should do much to stabilize production.

Import Control. Under the New Trade Agreement with the Union, all fresh vegetables from South Africa are subject to the imposition of a duty from the 1st July, 1955, the duty being suspended or imposed according to the domestic supply position. While only a partial implementation of this control has taken place so far it is certain that the protection afforded has already been helpful to local growers.

Onions. The reported acreage of onions grown in 1954 was 208 with a yield of 14,409 bags of 120 lb. The reduction of 72 acres as compared with the previous year is due to marketing difficulties experienced by some growers. Very early crops from the Sabi Valley were successfully marketed.

Glasshouses. A slight increase in glasshouse building took place, but no major extension of this method of cropping is apparent. Tomatoes, cucumbers, and climbing beans were grown with reasonable success but eelworm has already made an appearance and affected tomato crops.

Disease. Crops of the cabbage family were seriously damaged by Black Rot disease which makes its appearance with the rains. Attacks were encountered as late as July due to a long rainy season. No resistant commercial varieties are as yet available.

Seed Production. A continued interest in seed production was noted. Crops produced were lettuce, beans, green peas, tomato, marrow, squash and sweet peas. Most of the seed was exported. A joint inspection service was provided by the Seed Analyst and Senior Horticulturist.

Nursery Planting Material. Locally produced material is still small in relation to imports which were valued at £43,700 (1953 £27,615) during the past year.

General

Requests for horticultural services continue to be far beyond the capacity of one officer. It is essential, in the best interests of the industry to decentralize the work as much as possible.

Judging of fruit and vegetables was done at Lusaka, Bindura, Sinoia, Salisbury, Gwelo and Bulawayo Shows. Judging of flowers was done at nine horticultural shows in various districts and the finals of the Young Farmers' Clubs' competitions were also judged.

RHODES INYANGA ORCHARDS

Adequate rains with good distribution fell at Inyanga, a total of 49.78 inches was recorded. Frosts were less frequent but more severe than for many years. A ground temperature of 11 degrees F was recorded in August.

Fruit Crop. After the previous year's very heavy yields only moderate crops

were harvested during the current season. For the season 1,693 bushels of fruit, of which 1,540 bushels of apples were sold.

D.N.O.C. Spraying. A further year of Dinitro-ortho-cresol-oil dormant period spraying experiments of apples has confirmed earlier results. The effect has been that blossoming generally has been earlier, more concentrated and regular with better growth of the fruit.

Deficiency Diseases. Post blossom applications of magnesium sulphate were given to 60 selected trees of several varieties of apple, pear and plum for suspected deficiency. As expected little response was noticeable during the first year. The experiment is being continued.

Variety Introductions. To extend the apple season, particularly to obtain earlier supplies, scions of ten new varieties were obtained from the Union Department of Agriculture and grafted to established trees. Untried varieties of cool-climate peaches were introduced and also a collection of the Malling Merton apple rootstock types. Further trees were distributed to selected growers in other areas for wider trial.

Insect Pests and Diseases. Bagworm larvae were found for the first time attacking bearing apple trees and fruit. Hand picking and D.D.T. spraying were effective control measures.

Less "Bitter Rot" disease of apples occurred although some growers reported bad attacks. The basal opening of wind breaks considerably improved air circulation and may have been responsible for the lower incidence of the disease on the Station.

General

Cropping of cider apple varieties commenced. Small plot trials of legumes which may be suitable for orchard cover-cropping, showed the superiority of Red Clover which was able to compete with weed growth.

Re-grafted trees for improved pollination have made good growth. Early cropping is expected.

Many nursery trees were raised for Station planting and sale. A very successful Horticultural Show was held at the Station and is to be an annual event.

The Horticultural Officer attended the International Horticultural Congress held at Schevenningen, Holland.

GWEBI AGRICULTURAL COLLEGE

Education

Five courses of students have now passed out from the College. All 19 students who sat for the final examinations were awarded the Diploma of the College on Diploma Day on the 27th July, 1955. Whilst the top students did not gain quite such high marks as last year the tail was on the whole stronger, in other words the general average of the work was good, and the standard of work for the trophies was high.

It is of interest to note that enquiries for Gwebi-trained men increases and it is as yet impossible for the College to supply the demand of the Federation for trained young European farm assistants.

The expansion programme, which has been in progress, is now complete with the provision of accommodation for 70 students. The First Year Course (Course No. 7), which commences on the 29th September, 1955, is 44 strong. This number is perfectly satisfactory from the lecturing point of view but entails certain difficulties where practical work is concerned. An endeavour is being made to overcome the difficulties by splitting of groups at practical work, but it remains to be seen whether the instructional staff is adequate to deal with such large numbers. It may be necessary to ask for the establishment of additional posts.

The policy of bringing in external examiners to assist with final examinations was continued. The College was fortunate in obtaining the services of specialists in the various subjects from outside the College. Difficulty was, however, experienced when unavoidable business or personal matters interfered with the availability of these external examiners. The whole question of the wisdom or otherwise of using external examiners requires further investigation. The teaching at Gwebi is to a large extent specialized in relation to local conditions and there may be much in favour of the view, held by some people, that the man best qualified to examine the students is the man who has taught them, with perhaps advice and assistance from an external examiner. That is virtually the system in existence at present.

Visits to farms and institutions of interest in different parts of Rhodesia continued to be an extremely useful part of the instructional course. Twenty-two such visits were carried out by the Second Year students and ten visits by the First Year students. This year's tour for the Second Year students took place in the Midlands, ranging through Hartley and Gatooma to Que Que. Excellent reports of the tour were written by the students and there is no doubt that this concentrated week of visits to farms and places of interest is extremely valuable, particularly in the case of men nearing the completion of their Second Year.

Various developments took place in the method of teaching and examinations in the different sections. With poultry, for instance, the method of practical instruction was completely reorganized, the students attending in their normal groups for specific instruction in various practical matters; in the old days students went to practical work either singly or in pairs and purely carried out routine duties in the section. The new development was regarded as most satisfactory. The basic sciences of chemistry, geology, botany and zoology and also soil science, remain subjects in which a particular course may prove to be extremely interested, whilst a succeeding course will show little interest. Further steps have been taken to endeavour to stimulate interest in this important side of the course and to make it easier for those who find such subjects as chemistry rather difficult. More tutorials and practicals have been held in the laboratory, whilst it has been made possible for a student to pass his basic sciences in sections rather than being examined in the whole range of subjects at the end of the College First Year. In the subject of engineering, difficulty was experienced owing to the fact that the new Lecturer did not arrive until half way through the College Year; the subject was carried on by the Principal taking various sections of the syllabus and with the very greatly appreciated assistance of one or two itinerant lecturers, particularly the Chief Conservation Engineer and Mechanical Engineer seconded to the Conservation and Extension Department by C.M.E.D. The weakness of many students in elementary mathematics (despite selection of those who have obtained either a pass or credit in mathematics at school) continues to be an embarrassment in the teaching of engineering. In future, the Lecturer in Engineering intends to give students a test as soon as they arrive to examine the state of their mathematical knowledge; he will then give the opportunity of special coaching in mathematics to those who seem particularly weak in the subject.

Much has been learned about the organization of practical work as a whole and it is hoped to institute certain improvements throughout the College in the coming year. The organization of practical work is, of course, the most difficult part of administration at the College. Continued use has been made of educational films and Salisbury firms have once again freely co-operated in many demonstrations of equipment to students.

Sport continued to play an important part in the life of the College. Rugby was once again enthusiastically played, Cricket remained at its satisfactory level, whilst the College fielded a hockey team for the first time. Athletics were keenly pursued and water polo was encouraged with the opening of the College swimming bath.

It is with regret that the death, as the result of a motor accident, of a Second Year student, Peter Ellenberger, towards the end of the College year is reported.

Development

The main development during the year has, of course, been the completion of the building programme by the Public Works Department. The new blocks of bathrooms and bedroom wings have been completed; the kitchen, which now includes a cold room, has been expanded; an assembly hall and quiet rooms have been added to the College Hostel, whilst a new sick bay has been completed.

The sports fields are being extended to provide separate facilities for rugby and cricket. The swimming bath, commenced last year, has been completed and the filtration plant installed. The changing rooms were very largely built by the students themselves.

The College continues to be responsible for all buildings outside the European residential area. The new piggeries have been completed and the cattle pens constructed of metal, to house the dairy herd in winter, are of great interest to visitors.

Work continued on the African village, the first stage being completed with a row of brick under asbestos buildings intended for eventual occupation by single labourers; initially married families have been moved into these quarters and as further semi-detached and completely detached married quarters become available, the married families will be moved forward. A communal building, which will serve as a school for African children, has been constructed in the

African Village area and it is intended that a school will open in January, 1956, where about 70 children will be educated under the aegis of the Apostolic Mission.

A development has been the manufacture of soil-cement bricks which are being used in farm and other buildings in conjunction with burnt bricks. By this means it is expected to effect an economy in the cost of buildings.

In the fields the North East corner of the farm has been further developed with the fencing off of veld into five camps where it is intended to graze the Hereford herd in summer and feed it in winter on urea hay. On the South side of the farm, where despite the introduction of ploughing on the mean contour and trash farming, there is still some evidence of surface erosion, the development of ploughing and planting on the true contour is taking place. In the area North of the main road and on either side of the main entrance to the College, tree stumping is taking place and necessary conservation measures are being taken with a view to the development on the one side of the road of a unit system and on the other side, of a tobacco section. The latter section is intended to be small but is regarded as an essential development for the proper instruction of students.

Production

Rainfall was considerably above average, 38.27 inches compared with a 40 year mean of 31.957 inches. Distribution was poor, a dry November being followed by a very wet December and crop yields were undoubtedly reduced by the conditions prevailing, particularly groundnuts, potatoes and legume hay.

Field production included:—

Crops	*Acres*	*Production*	*Yield/Acre*
Maize (Broadbalk Field)	55	790 bags	14·4 bags
Maize (Gwebi South)	178	1,923 bags	10·8 bags
Sunflowers	12	61 bags	5·1 bags
Groundnuts	16	114 bags	7·1 bags
Potatoes	4	22 bags	5·5 bags
Natal Sugar Beans	11	35 bags	3·2 bags
Winter Feeds			
Maize Silage	47	412 tons	8·8 tons
Napier Silage	14	154 tons	11·0 tons
Legume Hay	155	63 tons	0·4 tons
Veld Hay (Fertilized)	30	45 tons	1·5 tons
Veld Hay (Non-fertilized)	54	27 tons	0·5 tons

The increased yield of hay from fertilized veld is interesting, and encouraging. This hay was stacked in the field and fed with urea and molasses to the Hereford herd in winter. The herd maintained itself well on this economical diet, and without the addition of concentrates. The pedigree Hereford herd has now increased to a total of 42 animals.

The Friesland herd has now increased to the following numbers:—

Pedigree Bulls	2
Pedigree Cows	14
Pedigree Heifers	8
Pedigree Calves	8
Grade Cows	31
Grade Heifers	22
Grade Calves	12
TOTAL	97

Last year an increase of 5,586 gallons of milk produced, over the previous year, was reported. The year now under review has shown a further increase of 3,825 gallons. The herd average has risen from 850 to just on a 1,000 gallons per cow. Once again the technique of providing a legume graze was successful in maintaining milk yield and the maize silage pits were once again not opened until mid-June. The Friesland herd moved into the new feeding pens, constructed of metal, in late August. The design and construction is proving most satisfactory.

A new Friesland bull, Rock Ridge Rikus, was purchased from South Africa; Shaapkraal Dramen returned from two years A.I. work with the Veterinary Department; Gwebi Adaema went to Grasslands Research Station, and Gwebi Nero to Chipinga Demonstration Farm.

The most interesting development in the pigs was the introduction of a Landrace gilt, in pig, which has since farrowed seven piglets.

The Poultry Section produced the following, during the period under review. Eggs, 9,657 dozen; table poultry, 6,783 lb. Cross-bred day-old chicks were produced in large numbers and supplied to poultry folds on grassland at Gwebi, fish experiments at Henderson Research Station, Sabi Valley Experiment Station for climatic studies and Tanganyika, Kenya and Northern Rhodesia for experimental work. The progeny of the Beltsville White and American Bronze turkeys imported from America in 1952, is now too inbred to permit of further supplies of breeding stock to the industry until new stock can be introduced.

Revenue from the College Farm was £11,119, whilst other revenue, including College fees, amounted to £8,902.

Research

Investigational work has gone ahead where possible, but as reported last year, and in view of the recent increase in student numbers, staff is inadequate for the carrying out of much consecutive work.

Crop Husbandry. In order to study the effects of a short ley continuously grazed (summer and winter) on our heavy soils, an experiment was set out in which two rotations are being compared. The first, a three-course rotation of maize; maize; green manure; managed in traditional fashion, and a five-course rotation of grass: grass: grass: maize: half legume hay—half maize silage. In the ley, three Hereford animals are kept on the grass shifts all the year round and receive hay, silage and cob meal with urea and molasses as supplementary feed during the winter. This, of course, is a long-term farming system investigation and it will be a few years before even observational evidence is available.

A maize trial was again carried out, the results being:

Southern Cross	21·29 bags/acre
52 DH 29	20·71 bags/acre
52 DH 32	19·72 bags/acre
52 DH 30	19·53 bags/acre
52 DH 60	19·53 bags/acre
Hickory King	17·16 bags/acre

No significant difference. The incidence of *Helminthosporium*, particularly on double hybrid strains, reduced yields, and it is believed that the applcation of sulphate of ammonia (250 lb./acre) to all plots levelled up differences between varieties and strains.

No difference was observed between treatments in a plant population experiment (10,00 up to 22,000 plants/acre) with maize, but each population treatment showed a marked preference for early planting as compared with late. There is scope for further complex experiments to study the inter actions of population: fertilizer: time of planting.

A combined nitrogen/phosphate rates experiment confirmed previous results that provided some phosphate is added there is little advantage from high rates, but that nitrogen as a top dressing is a most important part of fertilizer policy for maize.

A very interesting series of experiments were commenced to study fertilizer policy for maize following a grass ley, in this case Napier, which had not been grazed or fertilized intensively during the five years it was in. This work is in close collaboration with the Chemistry Branch. Variable rates of N, P and K, with and without lime, were used. Combinations of applications of N at planting time and with N as top-dressings were also compared. The experiment will be continued but, as might be anticipated, nitrogen played an outstandingly important role. Yields varied from 2 to 17 bags/acre, of maize.

In observation plots summer wheat (variety 294) suffered from continuous rain in early growth, and rust, yielding only 2.24 bags/acre.

The interesting work in soil moisture determinations with gypsum blocks was continued; the publication of a note on the early part of this work, in Gwebi College Progress Report 1950-54, March/April 1955, issue of the *Rhodesian Agricultural Journal* has brought inquiries from many parts regarding the method.

Veld Management. The Fertilizer-Grazing Trial initiated in 1953/54 on veld, was continued with the object of studying the production and changes occurring in veld used intensively. It is intended to continue this trial over a period of years. As only two seasons' results are available, it is not yet possible to draw definite conclusions as to the value of fertilizing as a means of increasing the productivity of beef steers grazing in the area. However, it is clear that on fertilized veld grazed by beef steers, the maximum yield of animal products per

acre can only be obtained by considerably increasing the stocking rate. The economics of fertilizing must therefore be estimated on a "per animal" and not a "per acre" basis. Considered in relation to a system of beef production which includes pen fattening the lower level of fertilizing used (150 lb. sulphate of ammonia, 150 lb. nitrolime, 150 lb. superphosphate, 50 lb muriate of potash, per acre; stocking rate 1 steer to 2.09 acres) may possibly be shown to be economic.

Engineering. A change of staff in the Engineering Section meant that work was mainly concentrated on education and production of mechanical devices and buildings for the farm and little time could be devoted to research. However, many interesting facts came to light in the construction of the new cattle pens, electric fencing and a spraying machine.

Animal Husbandry. The Animal Husbandry Section has still been unable to do much in the way of research, although the development of techniques of feeding and management, under practical conditions has been studied. The investigation of the comparative merits of certain exotic and indigenous breeds of beef cattle has entered a second phase with the commencement of a trial comprising Africander, Golden Dunn, Black Mashona and Hereford breeds.

College Council

The College Council remained constituted as previously: Mr. D. C. Lilford (Chairman), Lord Acton, Major H. G. Mundy, C.B.E., Mr. G. R. A. Johnson, Mr. H. H. Cole and the Principal (ex officio).

HENDERSON RESEARCH STATION

The Henderson Research Station is situated in the heart of the maize growing area of Mashonaland, a region blessed with an average annual rainfall of about 35 inches, large stretches of good arable soils and abundant water in rivers and marshy vleis. Of the land under the plough, approximately half is planted to maize each year. Of the remaining half a large proportion is sown to legumes and other crops which are ploughed under in the autumn in preparation for the succeeding year's maize. Only a small part of the maize and legumes is harvested as forage for livestock in the form of grains, hay and silage. The majority of the natural grazing is poor, except for a short period in summer, and as a result of the fact that most of the grain is sold and most of the legume crop is ploughed under, winter conditions are not good for cattle. Heavy costs are therefore incurred in the purchase of protein rich concentrate feeds for the limited numbers of milk and beef animals that are kept.

The contouring of the lands has greatly reduced wash and erosion, and farmers are raising the grain yields by mechanization, the judicious use of fertilizers, the use of locally produced hybrid maize seed and by increasing the maize plant populations from 5,000 to 10,000 or more per acre.

This area comprises some of the best farming land in Southern Africa and its potentialities for agricultural development are immense, even on those parts that are being farmed to-day. Much land is still idle. There is an urgent need to make fuller use of this most productive area of the Federation to meet the demand for more grain, meat and milk for the territory's rising population and to furnish, at an appropriate price, the varied diets which are associated with rising living standards.

The research programme on the Station has been concentrated on the increasing of maize yields, replacing as much as possible of the green manures with productive grain and forage crops, and expanding livestock production by an improvement in quality and amounts of grazing and locally produced forages. In addition to this purely agricultural research, the fisheries research centre is now fully equipped with 80 acres of fish ponds and dams with unfailing water supplies, a laboratory, equipment and staff, and will shortly be providing the foundation of experience and knowledge necessary for launching commercial and subsistence fish production on the tens of thousands of acres of small dams, and on the very large stretches of artificial and natural waters that await development.

Research on Crops

Maize. The main concern of the crops section has been the growing of the single cross hybrid maize seed on 80 acres. The crop comprised 105 bags of M9-9-5 x T4-7-2-1 and 236 bags of N3-4-1-9 x A5-7-6, the largest yet obtained.

Once again the hybrid maize has proved capable of yielding more grain per acre than the open pollinated varieties. Experimental yields were 9.5 and 10.6 bags per acre from Southern Cross and Hickory King as against 16.1 bags from the double hybrid 52.D32. Three other hybrids gave between 13.5 and 14.7 bags per acre.

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Since maize growing is the principal farming activity in this area, four experimental annual rotations with maze as the pivotal crop are now in their second year. The two maize and legume rotations with 250 lb. of sulphate of ammonia on the maize gave slightly more than 27 bags per acre. The two stubble mulched continuous maize plots with 750 lb. of sulphate of ammonia per acre gave just under 30 bags. It is too early to make any deductions as yet, but stubble mulching seems to permit the growing of heavy crops of maize in successive years, provided that sufficient nitrogen is added to eliminate any nitrogen starvation arising from the presence of the stubble. Work on this possibility, which can lead to large increases in grain production, is being extended in the coming year, but attention is being paid to the possibility of a spread of *Helminthosporium* and other diseases that may follow such a return to monoculture.

Wheat. Work on summer wheat was continued in the form of a fertilizer experiment. The wet season caused rust to develop badly, and only a poor crop, up to 2.45 bags per acre on the best treatment, was reaped. The principal need still is to find a suitable high yielding strain which will do well under these conditions. As the fertility problem is secondary, this experiment will not be repeated.

Cotton. An experiment on the use of insecticidal sprays and dusts on cotton showed that both spraying and dusting increase the yields of clean seed cotton. Spraying four times at weekly intervals with a mixture of 1 lb. of E. 27 D.D.T. and 3 lb. of Hibex BHC per acre gave a yield of 457 lb. of clean cotton per acre. Dusting eight times, 10 lb. of a mixture of 10 per cent. DDT and 3 per cent. BHC gave a yield of 339 lb. Where neither spraying nor dusting was done, the yield of clean cotton was 107 lb.

Weed Control. The control of weeds by the use of hormone weed killers has undoubtedly an important place in the future on these heavy soils which are often so wet that it is harmful to use tractors for cultivation, for several weeks on end. It has been found that the application of spray to maize lands five days after sowing is not always possible with tractors on account of wet weather, and the low volume, high pressure sprayers which can be carried in the field eliminate this diffifficulty. Considerable damage can be done by untimely spraying and both small scale and large field scale work is being done.

The crops research programme needs to be extended greatly but hitherto it has been impossible on account of the fact that priority had to be given to the production of the single hybrid maize seed, and this occupied a large percentage of the time of the supervisory and labour staff. With the recent transfer of a Senior Agronomist from the Sabi Experiment Station to Henderson, a substantial experimental programme is being planned on both dry and irrigated crops, particularly legumes, in the coming season.

Research on Diversified Farming

Concurrently with these efforts to improve the productivity of the grain lands by new cropping techniques, research is in progress on the development of diversified farming. In other countries it has been found that crop production can be continued indefinitely on flatter, richer and more stable soils, provided that close attention is paid to appropriate rotational, manurial and conservation practices. Other soils, which become difficult to work and costly to maintain in good heart after a few years of annual cropping, can be restored to something akin to their original virgin state by a period under a perennial pasture ley. Other soils can best be used for permanent grazing land, more or less improved by grazing management, the application of fertilizers and the introduction of high yielding herbage plants.

The most desirable use to which any particular piece of land can be put has long been a subject of controversy, and there will be no quick road to agreement. In this area, many different soil types exist, but hitherto, with a few notable exceptions, little has been done with pastures on any of the arable soils. The approach to research on this subject is complicated by the fact that pastures are paid for by the livestock that graze them, and a successful cattle regime can only be instituted throughout the region by a full integration of such sources of feed as the natural grazing, improved pastures, forage crops and other crop residues into a continuous flow of feed throughout the year, for consumption by a type of livestock best able to convert that feed into meat or milk.

In view of the complexity of the inter-relationships between soils, pastures, animals and crops, a direct study is being made of selected forms of diversified farming at widely different levels of intensification, on experimental farm scale units. These units are bringing together a wealth of information on diversified farming, and are focussing attention on those aspects of pasture, animal and crop husbandry which are most in need of critical study.

Experimental Unit. One experimental unit is now in full operation and consists of 160 acres of veld for summer grazing, 70 acres of permanent artificial

pasture for autumn, winter and spring grazing, and 70 acres of arable land farmed on a 10-year rotation with pastures and crops. There are 10 sections allowing approximately 28 acres of maize for grain, 28 acres of Napier Fodder for silage and winter grazing, and 14 acres of legumes for grain and hay. The cropping sequence on each section following 4 years under grass is maize; maize; legume; maize; legume; maize under-planted with Napier Fodder. Fifty dairy cattle and 70 trek oxen are fed on the Unit which produces milk and maize for sale.

The initial stages of creating a sequence of grazing and forages for the 70 head of cattle have been completed and the animals graze the veld in spring and early summer, moving over to artificial pastures as the veld becomes poor in late summer and autumn. Napier gives green grazing through most of the winter and in early spring, and the conserved winter bulk feeds comprise Napier silage and stover ad. lib., together with grass and legume hays. With the aid of urea, these bulk feeds give substantially more than maintenance requirements through winter, and good grazing through the growth period.

This unit has reached the stage where its practical value can be assessed. It has been brought under the control and supervision of an advisory committee consisting of two farmers, the Officer-in-Charge, and the Accountant, Federal Ministry of Agriculture. Detailed costings are being kept and the unit is organized with its own funds as a trading account in terms of authority issued by Treasury. This provides material for an exacting and unequivocal analysis of the payability of the system. It appears so far that this small farm could be run with a capital of £7,000 for livestock, implements and running expenses, apart from the cost of land, water, buildings etc., which can legitimately be regarded as landlord's expenses. The gross revenue deriving from the sale of fresh milk and maize promises to be in the region of £3,000 and £800 p.a. respectively.

At the same time, a study is being made of the long term effect on the soils from this particular form of land use which should produce some 400 bags of grain and 18,000 gallons of milk each year from 70 acres of arable land and 230 acres of pasture. Some £450 worth of phosphatic and nitrogenous fertilizers are applied each year to the 70 acres of arable land.

It is anticipated that at least two years will elapse before any critical evaluation of the system can be attempted.

Units in the Planning Stage. Additional units, for which preparations are being made, include a purely grazing system with a Mashona breeding herd living on natural grazing throughout the year, supplemented by an appropriate area of permanent Napier for winter grazing. The cost of such an improvement of grazing for livestock is low, and little or no fertilizer is needed.

Another experimental system consists of 20 acres of irrigated pastures and forages coupled with a suitable area of dryland pastures and crops, for intensive milk production.

Lastly, 300 acres of veld and artificial pastures are to be used by a beef breeding herd living on veld and pasture grazing in summer and on silage, hays and crop residues in the winter. Fat steers, 2½ to 3½ years old are to be sold.

These attempts at integration of various phases of diversified farming into coherent systems, bring together a mass of information on different forms of land use and are focussing attention on those aspects of agricultural science most immediately in need of critical study, particularly in the fields of pasture improvement, animal husbandry and erosion control.

Research on Pastures

The Improvement of Autumn Grazing

It has become clear that the veld yields productive grazing only during the early part of summer, and Giant and Australian Rhodes Grass, Star, Makarikari Panicum, Kazengula Setaria, Sudan and Napier Fodder are being experimented on in grazing fields to ascertain how best to achieve a productive sequence of grazing from early January until May. Rhodes Grass and Star, fertilized at the rate of 200 lb. of superphosphate and 200 lb. of ammonium sulphate carried two steers per acre for 50 days, and later gave a hay crop. Daily liveweight gains were in the vicinity of 1.75 lb. per steer. From the end of February the value of the grazing from all the pastures was disappointing, whether the grasses were mown for silage in January or rested until February, and it is clear that improvements in quality must be sought by way of a second nitrogen dressing in February. These experiments will continue in the coming season.

Irrigated Pastures. Throughout the long winter it is necessary to supplement the maize stover, grass silages and hays with large amounts of concentrates. The bulk feeds are gravely deficient in protein partly as a result of the fact that such a large proportion of the legume crop is ploughed under each year as a green

manure. A series of irrigated pastures have been established on 10 acres of red soil to determine their value as a winter green, protein rich supplement that can be grown on the farm. Four different mixtures of grasses and legumes were grazed during the past winter by steers which were receiving a bulk ration of 15 lb. of Napier silage and 4 lb. of maize stover each day. They were allowed three hours of free grazing on these pastures every afternoon. The fertilizer applications were the same in all cases consisting of 600 lb. of nitrolime in three equal dressings and one 400 lb. dressing of superphosphate annually. The high productivity of these pastures is indicated by the following comparison.

a. Mixed Italian ryegrass, Phalaris, Lucerne and clover pasture in 600 days yielded 859 lb. of liveweight increase in steers.

b. Mixed Kikuyu and clover pasture in 609 days yielded 822 lb. of liveweight increase.

c. Mixed *Paspalum dilatatum* and clover pasture in 609 days yielded 787 lb. of liveweight increase.

In addition to this winter grazing, these pastures yielded 1 ton of high quality hay and 5.4 tons of silage per acre during the previous summer.

Dryland Pasture Legumes

The final selection of legumes for inclusion in the forage flow has been made, and work on establishment and management techniques will start in the coming season. Trials on these legumes have indicated that they are capable of producing large amounts of protein rich fodder and are suited to the local conditions. The species selected are *Crotolaria paulina, Vigna parviflora, Glycine Javanica* (variety Citrus). *Teramnus uncinatus, Desmodium tortuosum* and *Canavalia ensiformis* (Jack bean). The Jack bean produced 12 bags of clean seed per acre, which when milled can be fed to stock. The importance of scarifying or acid treating the legume seeds that have hard coats cannot be stressed too strongly.

The Effect of Various Manurial and Cultivation Treatments on the Productivity of Napier Fodder

This large experiment on the management of Napier Fodder has now completed its term of four years. It has shown that root pruning with rigid tined or disced implements once each season causes a 25 per cent. increase in the yield of herbage. Deep cultivation more than once per season gives no further increase in yield. Throughout the four years the heaviest yield of herbage, in the region of 40 tons of green matter per acre, has been obtained from the plots which receive both superphosphate and sulphate of ammonia at the rate of 400 lb. and 1,000 lb. respectively. Good growth was also obtained from half these dressings. This experimental area has now been ploughed and test cropping will follow to explore the influence of the four years of grass and the various treatments on the fertility and workability of the soil.

General Observations on Pastures

It has been found that dry land Napier Fodder can furnish green grazing in substantial quantities through winter until severe frosts. In the past season green Napier was being grazed until the 8th August, and the grass was growing again at the end of September, providing a valuable early bite for two months before the rains. It seems likely that a proper succession of pastures may provide green grazing for cattle for eight to ten months of the year, without the assistance of irrigation. These possibilities are being explored in detail.

Many difficulties have been experienced with hay and silage making. There is an abundance of herbage throughout the summer, but it is far from easy to conserve its nutritional qualities and particularly its protein content. In view of the severe shortage of proteins all available means for improving the nutritional qualities of the bulk winter feeds are being explored experimentally. These include haymaking on tripods, barn hay drying, the use of urea, the growing of legume grains and long lived legume hay crops to be harvested after the rains have stopped, the inter-sowing of maize with legumes to improve the stover, and comprehensive studies of various methods of making silage. The results so far are encouraging, and there are grounds for confidence that the winter bulk feeds will be greatly improved in the future.

Research on Animal Production

During the past year progress has been made in the development of facilities for research in this section. For the greater part of the year the Animal Husbandry Officer was the only member of staff, but recently the post of Stockman has been filled and it is anticipated that the activities of the section can now be safely increased.

Winter Beef Production. The steer feeding project initiated two years ago with 105 steers has been completed and, although accurate analytical figures are not yet available, it is clear that young beef of very high quality can be produced in this country. The roughages normally fed in rations are inherently deficient in protein and appear to be of low quality, necessitating heavy and expensive concentrate feeding to achieve satisfactory growth. Many of the steers offered for sale as feeders are of poor quality, are hard feeders and produce carcases of poor conformation and low fat content.

Digestibility Studies. Studies are being made of the digestibility and nutritional values of our veld, ley pastures and feeds commonly fed in this country. During the past year a special building has been erected to house a digestion study unit and it is now fully equipped with digestion crates for sheep, harnesses and all necessary apparatus for critical work. This project will provide a firm basis for the planning of animal production in the area.

Cattle. Various forms of animal husbandry are being studied and these include intensive milk and beef production and extensive beef raising from veld, improved pastures both dryland and irrigated conserved feeds and crop residues supplemented by enough concentrates to ensure efficient feed conversion. There are grounds for believing that nutritional deficiencies constitute the main limiting factor to animal production in this region. It may be, however, that some breeds are physiologically better adapted to this set of environmental conditions, and on this account four breeds of cattle in separate breeding herds will be used for studying the influence of nutrition on growth, production and reproduction in the case of each breed. The breeds selected are Jerseys, Angus, Africanders and Mashonas. The numbers of cattle have been built up to approximately 400 head, and revenue from livestock sales in the past year has been above £5,000.

Development. The facilities of the Section have been developed over the past two years from nil. The facilities now comprise winter feeding pen accommodation for 200 head of cattle, including individual feeding pens for 40 head, silos for 1,200 tons of silage, two Dutch barns measuring 50 x 40 sq feet each, a dairy, cow-byre, bull and calf houses. Some 600 acres of veld have been fenced and subdivided, and the dip, weighbridge and sorting pens have been modernized and extended.

RESEARCH IN EROSION CONTROL

(Carried out by Officers of the Department of Conservation and Extension)

In association with the work on crops, pastures and animals, a great deal of effort is being spent on determining how much soil and water are lost from various crops grown in different ways, on different soils and different slopes. The programme is in three series, one which has completed its second rainfall year on sedimentary Tatagura clay, another which has completed its first rainfall year, on a good red clay derived from basic, igneous rocks, and the third, which is still under construction, on granite sand.

On the Tatagura clay series of 1/20th acre run-off and erosion plots, certain modifications were made for the past season, such as the installation of additional flow-recorders, covers for collecting troughs, and improved screens. The season was most unusual in that although the total rainfall was well above the average, no heavy storm occurred.

The most important results were:—

(a) Run-off and erosion were greater from maize plots after the green crop, than from maize after maize. It is presumed that this is the effect of the very severe battering received by the green crop plots during the previous year.

(b) Both run-off and erosion were almost eliminated by the combined treatment of stubble mulching and high maize population (15,000 plants per acre). The relative figures on a 6½ per cent. slope are as follows:—

	Yield in Bags per acre	Run-off inches	Soil Loss in tons per acre
Maize (after sunnhemp), 10,000 plants per acre .	28	10	5·5
Maize (after Maize), 10,000 plants per acre . .	25	7	1·7
Maize (after maize and mulched), 15,000 plants per acre	43	0·7	0·3
Second-year Napier Fodder	—	1	0·2
Second-year Star Grass	—	2·5	0·02

This interesting result of 53 bags of maize per acre from the mulched plot has led to the installation of two additional plots on the 4½ per cent. slope, both of which will be planted with maize each year at the rate of 15,000 plants per acre. One plot will be stubble mulched and the other will have the maize stover removed. These plots will make possible the separate assessment of the effects of mulching plant population and rate of fertilizer application.

On the red soil a comparable series of plots have been installed and these are settling down and will give their first figures during the coming season.

Granite Sands. Two types of granite sandy soil are found on the Station, steep well-drained slopes towards the foothills, and flatter poorly drained areas lower down the slope. Since neither can be said to be typical sand veld, experiments are under construction on both.

Initially the large-scale 1/20th acre plots will be installed, concerned chiefly with maize growing practices and methods of tobacco growing. Provision has been made for additional small scale experiments to be added later. It is hoped to bring both series to a stage where at least a partial record is obtained during the 1955/56 season. Both series are of a new design using an improved system of tanks and divisors which allow all the recording to be taken under cover in one central building incorporating an office.

Field Scale Stubble Mulching Trials. Since it is not possible to apply field scale mulching to the 1/20th acre plots, three large plots of approximately 4 acres each are being laid out to test two methods of mulching against a normal maize green manure rotation.

The first season will be a uniformity trial and the installation will be completed during the season. Initially run-off only will be measured, but eventually it will be possible to modify the experiment to record soil losses.

Auxiliary Investigations. Exploratory work has begun on soil moisture determinations, canopy interception, density of cover, and infiltration, using the concentric type infiltrometer. In each case all that can be done at the moment is an initial exploration of methods of approach, as each of these subjects would wholly occupy a research officer, if properly pursued.

FISH PRODUCTION

During the year under review every effort has been made to bring the building and constructional work on the Experimental Fish Farm to a stage where more attention can be given to research. There is an increasing interest in fish culture and a growing awareness of the fisheries potentialities of the territory, especially in regard to water resources development.

Organization and Staff. The Fisheries Section on Henderson Research Station has the task of co-ordinating and directing fish production activities throughout the territory. In addition to research it is concerned with the development of inland fisheries, advice on fisheries policy, and extension and advisory work. Liaison with Angling Societies, Farmers' Associations and various Government Departments is maintained.

Lack of staff was severely felt during the first half of the year, and of necessity the Senior Fisheries Officer was heavily engaged on details of construction work. The existing staff accepted posting to the Federal Service as from the 1st January 1955. As a result, the Senior Fisheries Officer, Dr. Maar, now holds the position of Chief Fisheries Officer and the Technical Assistant has been posted to Special Grade Assistant. In April 1955 an additional professional officer was appointed.

Development. The entire outlay for completing the development of the Experimental Fish Farm has been met out of running expenses. The principal items have been the erection and completion of buildings, their fittings and installations, constructional work on ponds and experimental tanks, running of the animal section, tools and agricultural implements, and finally, laboratory accessories and equipment.

Construction of all works is virtually complete and research and experiments may now be carried out on a scale satisfactory for the present. Fry production ponds have not been built, but until special funds and facilities such as contractors to build these are made available they will have to be shelved.

Observations and Research. Hydrobiological and fisheries observations have continued as routine. Results of research initiated during the year are not available until March/April 1956. However production of approximately 300 lb. per acre per annum has been estimated in mono-species culture. This figure can be increased by culture of two different species with artificial feeding.

General. Advisory services to farmers and others were given when possible and an exhibit on the Salisbury Show in 1955 had a member of staff in attendance and many queries were answered. Visitors to the Fisheries were numerous and included school children, farmers, members of the public and scientific workers from abroad.

ESTATE SECTION

Buildings. A large amount of building has been done during the year and includes the completion of the new mill house and grain silo with a capacity of 1,400 bags, the building of four double compound houses to accommodate eight families, also native wash rooms and lavatories, the building of a calf-house and bull pen, the conversion of a large shed into workshops and store, the provision of four new offices in an old barn, two rondavels for bachelor quarters, a new school classroom, and the general maintenance and repair of farm buildings.

Water Supply. Water supplies have again proved inadequate. The Irrigation Department has undertaken the re-organization of the reticulation system, and has sunk a new borehole which tested 1,500 gallons per hour. This will be equipped and connected with the ring main.

Farm Lands. A very successful maize season gave a yield of 2,000 bags of maize from 100 acres. The green manure crops were a total failure as a result of vine rot. Approximately 30 acres were replanted to sunflower and this gave an excellent green manure.

Two hundred and fifty acres of farm land are being worked as a ley rotation comprising 100 acres of maize, 100 acres of ley and 50 acres of legumes each year. Towards this end 25 acres of Napier and 25 acres of Makarikari Panicum have been planted.

GRASSLANDS RESEARCH STATION

Grasslands Research Station, at Marandellas, is the regional agricultural research station for the sandveld of the highlying, better rainfall parts of Southern Rhodesia. Attached to it is the Sub-station at Melsetter which serves the Eastern Districts.

Weather. The rainfall for the year was 40.52 inches, 4.73 inches above normal. Most of the rain fell in December and January and thereafter was very spasmodic. The poor distribution was reflected by low grass yields in the second half of the season. Good crop yields were obtained, however.

Ground frosts were general in June, July and August, the average ground minima for those months being 33.8°F, 30.8°F and 32.3°F respectively. The absolute ground minimum was 15.3°F, and the absolute screen minimum was 31.0°F, both recorded in August. The absolute maximum was 90.4°F, while maximum screen temperature reached or exceeded 85°F on ten days — nine in October and one in November.

Development of the Station

Fencing. The erection of fences in accordance with the planning of the system of veld management has continued. Several miles of new fencing have been put up, mainly with material salvaged from old fences that were no longer required.

Roads and Firebreaks

About three miles of new road have been made, and about sixteen miles of existing road re-graded. Twelve miles of firebreak were cleared and burned.

Irrigation

Work on the new 40-acre irrigation scheme has continued during the year. Twenty-five acres of the area were stumped, and a considerable amount of rock was blasted. Eighteen acres have been ploughed, and will be planted to velvet beans as soon as the sprays are in operation.

Considerable progress has been made with the spray system. A pump-house has been built below the wall of the Jack White dam, and an electric motor and centrifugal pump have been installed. The 6" rising main and the stand-pipes for the spray couplings have been laid.

The Jack White Dam

Rill erosion, which was bad on both sides of the dam wall, has been stabilized by the planting of Star Grass No. 2 on both faces of the wall. Creeping forms of Antelope Grass (*Echinochloa pyramidalis*) were planted along the water line in an attempt to stop wave-action, but heavy rains in November and

December 1954, caused such washing of soil as to prevent the grass from rooting. To provide the necessary protection from wave-action at full supply level a breakwater fence, constructed of gum off-cuts, was built along the entire length of the wall. This was very effective.

Gauging Weir. During the winter of 1955, a gauging weir was built across a small stream which feeds into the main Hunyani stream. It was constructed by the Department of Irrigation, and has four subsidiary weirs and a large central V-notch. An automatic water level recorder and a gauge plate were installed in September by an officer of the Hydrological Branch.

The reading of levels and the changing of the charts has been undertaken by the Station, and this work will be organized by the officer who supervises the meteorological stations. It is proposed to set up another meteorological station at the gauging weir, as well as several rain gauges to cover the catchment area. For this work another African Meteorological Observer will be required.

New Lands: Windmill Block

In 1953/54, about 100 acres of the Windmill Block were cleared and prepared for cultivation. About 20 acres of this block were seeded to Katambora Rhodes Grass and African Foxtail in January, 1954. In November 1954, a further 80 acres were seeded to four grass/lucerne/dahl mixtures using Kazungula Setaria, Katambora Rhodes, Bambatsi Panicum and African Foxtail as the grasses. There were 20 acres of each mixture.

New Lands: Dam Block

This block — 60 acres in extent — was cleared and prepared for cultivation during 1954. In November 1954, 15 acres were planted with maize, 15 acres to Katambora Rhodes Grass, 15 acres to velvet beans, and later a further 15 acres was rough-ploughed and planted to velvet beans.

Staff Quarters. Two new houses were built during the year but only one of these was for use of the Station staff, the other being for the Department of Conservation and Extension. The housing situation on the Station is still acute, one professional officer and one technical assistant having to live off the Station.

African Village. Two houses which were under construction in September, 1954, have been completed and three more houses for married Africans were built during the year. Two of the new houses are for African Assistants.

Barn Hay Drier. A small barn hay drier was completed in April, 1955. It is made of brick, plastered inside, with a loading capacity of 2,250 cubic feet. Air is blown in by an electric fan, set outside below floor level, and passes through a sloping air duct in the floor of the barn.

Domestic Water. The domestic water supply was greatly improved during the year. The Department of Irrigation laid a new water main from the bore-hole at the 4-acre irrigation scheme to a brick reservoir at the north corner of Block 7. From here another main was laid along the line of houses near the Watershed road, right down to the Dairy. Water gravitates down this pipe from the reservoir to supply points, and in addition, the existing bore-holes and reticulation system feed into the new main.

Crops and Fodder Conservation

Maize. Fifteen acres of virgin land were planted with hybrid maize and a good crop, of about 16 bags per acre, was reaped.

Velvet Beans. Thirty acres of virgin land were planted with Somerset velvet beans. The early-planted beans produced a fair crop, while the later plantings gave a poor crop. The whole crop was ensiled with Katambora Rhodes Grass.

Hay and Silage. No sun-cured hay was made during the year. A small quantity of hay was made in the barn drier, using material from the grass/clover mixtures in the 4-acre irrigation scheme. The hay produced was of good quality with a crude protein content of up to 18 per cent.

Some 800 tons of grass silage was made and the silage was all of good quality. Once again the trench silos had far less wastage compared with the tower silos.

Dried Grass. About 27 tons of dried hay was produced from the Slade-Curran grass drier. The material dried in the early part of the season was mainly Star Grass, and later on velvet beans were used. The quality of the product was still not as good as might be expected. Plans have been made to improve the whole process of grass drying during the coming season.

Water Relations

Lysimeters. The treatments applied in the 1953/54 season were repeated except for an increase in the maize population which was changed to 15,390 plants per acre. The two maize plots were planted on November 16th, and yielded a mean of over 30 bags per acre. Yields from the four Star Grass plots were not good, mainly due to the uneven rainfall, but also due, in part, to the method of applying the ammonium sulphate. The percolation from the maize lysimeters averaged 14.77 inches of rainfall, that from the Star Grass lysimeters 13.23 inches, and that from the bare lysimeters 33.65 inches.

Run-off Plots. The eight run-off plots were subjected to the same treatments as in the 1953/54 season. The six plots planted to maize yielded a mean of 27 bags per acre. The one velvet bean plot yielded 5,540 lb. of dry matter per acre. Run-off was neglible, the most recorded being 0.49 inches of rainfall, as run-off from velvet beans.

Experiments with Cultivated Grasses

Star Grass

(1) *The effect of Nitrogen, Phosphate, Potash and Lime on the Yield and Quality of Star Grass cut twice a season for hay. (Experiment 47.)*

As this experiment is to be terminated in the coming season (1955/56) the important results of the last four seasons (1951/52 to 1954/55) are presented.

The mean yields for the four seasons in response to 0, 300, 600 and 900 lb. ammonium sulphate per acre were 1002, 1475, 4282 and 5998 lb. of dry matter per acre respectively.

Super/raw rock phosphate had quite a strong interaction with nitrogen over the four seasons as shown in the following table:—

MEAN YIELDS OF STAR GRASS HAY, 1951–55 (N x P interaction)

Super/Raw Rock Phosphate in lb. per acre	Ammonium Sulphate, lb. per acre				S.E.	Significance
	0	300	600	900		
0	960	2,300	3,930	5,500	± 50	Ni +++ P +++
300	1,040	2,650	4,630	6,490		Ni x P ++

Potash had no marked effect on dry matter yields.

Lime had a slightly beneficial effect in the first season, but increasingly depressed yields, though only slightly, in subsequent seasons.

(2) *The effect of Potash, Lime and Nitrogen on the Yield and Quality of Star Grass cut twice a season for hay. (Experiment 49.)*

This experiment is to be terminated in the coming season (1955/56), and the results for the past four seasons, 1951 to 1955, are presented.

Lime showed a constant tendency to depress yields. The mean yields in response to 0, 1,000, 2,000 and 3,000 lb. of agricultural lime per acre were 3,675, 3,290, 2,960 and 2,670 lb. of dry matter per acre.

Potassium chloride had no marked effect on dry matter yield, while the use of 900 lb. ammonium sulphate per acre gave from four to seven times the yield as compared to the yield with no nitrogen applied.

(3) *The effect of Nitrogen and Frequency of Cutting on the Yield and Quality of Star Grass hay. (Experiment 87.)*

This experiment after running for two seasons, was terminated at the end of the 1954/55 season. Results for the two seasons are summarized in the following tables:—

Mean Yield of Star Grass Hay
in lb. per acre. (Main N effect)

Season	Ammonium Sulphate, lb. per acre						S.E.	Significance
	0	500	1,000	1,500	2,000	2,500		
1953–54 . . .	1,030	2,710	4,610	6,030	6,940	8,165	±348	Ni +++
1954–55 . . .	1,500	5,660	8,440	9,340	10,340	10,660	±330	Ni +++ Nii +++

In both seasons the response to additional dressings of ammonium sulphate has tended to fall off after the 1,000 lb. dressing.

Bambatsi Panicum. In an experiment on Bambatsi Panicum, in which the effect of nitrogen, potash and lime were tested, the only fertilizer which had any marked effect was ammonium sulphate. The experiment ran for two seasons and is now ended.

In the first season (1953/54) the mean yield of dry matter rose from 3,180 to 4,130 lb. per acre when the level of ammonium sulphate was increased from 0 to 600 lb. per acre, but when it was increased to 900 lb. per acre the yield dropped to 3,900 lb. per acre. In the second season (1954/55) the mean yield of dry matter rose from 3,360 to 5,160 lb. per acre as the level of ammonium sulphate was increased from 0 to 900 lb. per acre.

Napier Fodder. In an experiment in which Napier Fodder is cut once, twice and thrice a season, cutting was the only treatment which had any marked effect on dry matter yields. With 1, 2 and 3 cuts per season the dry matter yields were 17,710, 9,930 and 6,890 lb. per acre respectively.

In the 1953/54 season the levels of ammonium sulphate were 1,000, 2,000 and 3,000 lb. per acre. In the season under review the dressings were reduced to 300, 600 and 900 lb. per acre. In neither season did nitrogen have any marked effect on yield.

In this experiment longevity checks are carried out twice a year, once before the rainy season when the new growth is fairly well advanced, and once after the last cuts of the season allowing for the stools to put on sufficient regrowth for comparisons to be made. Every stool is checked and a note of dead and dying stools made on a field plan. The number of dead stools has increased steadily since the first check was made, and in the October check ten per cent. of the stools were found to be dead. The deaths appear to be connected with the higher frequency of cutting and the closer spacing (6′ between rows). From observations made on stands of Napier Fodder in the same block, it is very likely that Cockchafer grubs are responsible for the deaths by eating the roots of the Napier, but this cause hase yet to be confirmed in the experiment itself.

Fertilizers and Frequency of Cutting on Katambora Rhodes Grass. (Experiment 101.)

This experiment was started in December, 1954, to study the effects of quantity of nitrogen, quantity of P_2O_5 and frequency of cutting on the yield of Katambora Rhodes Grass. Four different levels of ammonium sulphate were tested, combined with 2 cuts and 3 cuts a season, and four levels of superphosphate.

The different levels of ammonium sulphate were to have been applied in six equal dressings, but in fact the fifth and sixth dressings were put on together. This was due to the marked falling-off of the rainfall after the end of January. For the same reason the final cut of the 3-cuts-per-season series was not taken.

Nitrogen had a marked effect on the dry matter yield, the mean seasonal yields with 0, 60, 120 and 180 lb. nitrogen per acre being 2,510, 4,520, 6,335 and 7,320 lb. respectively. There was no significant difference between the responses to the levels of superphosphate.

Fertilizers and Frequency of Cutting on Chipinga Foxtail Grass (Cenchrus ciliaris). (Experiment 102.)

This experiment was started in December, 1954, and is a companion to Experiment 101, having the same treatmnets. As in Experiment 101, the fifth and sixth dressings of ammonium sulphate were applied together, and the last cut of the 3-cuts-per-season series was not taken.

The response of the Foxtail to Nitrogen was not as marked as in the case of the Katambora Rhodes Grass, though it was the only treatment which had any significant effect on dry matter yield. The mean seasonal yields of dry matter with 0, 60, 120 and 180 lb. nitrogen per acre were 5,190, 5,580, 6,210 and 6,205 lb. per acre.

Within each plot a strip of grass was allowed to grow out for seed, which was collected on several occasions as it became ripe. Both nitrogen and phosphate increased the yield of seed. The yield of seed rose from 430 lb. per acre to 640 lb. per acre when the level of nitrogen was increased from 0 to 180 lb. per acre. When the level of P_2O_5 was increased from 0 to 90 lb. per acre the yield of seed rose from 525 lb. per acre to 630 lb. per acre. There was, however, no interaction between nitrogen and phosphate.

Grasses for the Extension of the Grazing Season

One of the objects of the work of the Station is to develop pastures which will start growing early in the season, and continue growing for some time after the

main rains have stopped. It is thought that pastures composed of grasses grown in rows will be more suitable than sward pastures for this purpose, as they will not use the available soil moisture as rapidly as close swards do.

As part of this work an experiment was laid down in January, 1954, in which the growth of five different grasses, grown at three different row-spacings, is being compared. The five grasses are Napier Fodder, Bambatsi Panicum, Ngamiland Setaria, Kazungula Setaria and Antelope Grass (Sihubu strain). All are grown with 3, 6 and 9 ft. between rows.

For the remainder of the 1953/54 season the grasses were allowed to become established. In the season under review all plots received the same amounts of fertilizer, and all plots were cut twice. The Napier Fodder gave the highest mean yield of dry matter for the season, and was a consistently high yielder over the range of row-spacings. The two Setaria grasses outyielded Napier Fodder at the 3 ft. spacing, but their yields fell off markedly as spacing increased to 9 ft.

Crop Experiments

Maize. Six maize experiments were conducted in the 1954/55 season. In these experiments the effects of nitrogen, phosphate and populations were studied. In two of the experiments four varieties were compared. The average grain yields were good, many treatments gave well over 20 bags per acre, and some gave over 30 bags per acre.

Three hybrid strains from the Salisbury Experiment Station yielded, on the average, 80 per cent. better than the four open-pollinated varieties tested, the single hybrid N3-1-4-9 x A5-7-6 being one of the best.

Applications of ammonium sulphate at planting time, when the plants were five weeks old, and when they were ten weeks old all increased yields. Ammonium sulphate was a more suitable form of nitrogen than nitro-lime. The hybrids were more able to use nitrogen, especially at the higher levels of fertilization with ammonium sulphate, than were the standard varieties.

Responses to phosphate were small and erratic in nature, which was in marked contrast to the findings in the 1953/54 season. It was shown, however, that it was better to put the phosphate below the soil surface (either banded or broadcast-and-ploughed-in) than to broadcast it on the surface.

In two experiments a wide range of plant populations were studied. In one experiment the mean effect was insignificant, in the other, increased populations decreased yield, though the yield from hybrid varieties was little affected by the population being doubled from 9,680 to 19,360 plants per acre.

No significant interaction between phosphate and population was found this season, which was in strong contrast to the findings in the 1953/54 season.

Velvet Beans. In an experiment in which the effects of phosphate, method of applying phosphate, and lime were studied, lime was the only treatment which had any significant effect. When the level of lime was increased from 0 to 1,000 lb. per acre, the dry matter yield of bean fodder rose from 2,900 to 3,520 lb. per acre.

Superphosphate at 20, 60, 100 and 140 lb. P_2O_5 per acre; and potassium chloride at 0 and 45 lb. K_2O per acre had no marked effect on yield.

There was no difference between broadcasting the phosphate and ploughing it in, and banding it beneath the soil surface.

Lucerne. In an experiment to study the effect of potash on the yield of lucerne grown with different spaces between rows, it was found that yields tended to decrease as the spacing between rows increased, the mean seasonal yields at 15, 30, 45 and 60 inches between rows being 1,560, 1,600, 1,280 and 940 lb. of dry matter per acre respectively. Potassium chloride applied at rates of 0, 150 and 300 lb. per acre had no marked effect on dry matter yield.

In another experiment in which the effect of various fertilizers and trace-elements on the establishment and early growth of lucerne were being studied, the area was so badly washed by heavy rain in January, that it could not be regarded as a formal experiment. There were, however, marked differences in the growth of the plots, and the experiment will be repeated in the coming season. The results of a scoring made in April, 1955, indicated that the application of a mixture of borax and potassium iodide had improved growth considerably.

A variety trial, in which 22 varieties of lucerne are being compared, was planted in March, 1955. Germination and establishment were good, but it is too soon to say which varieties show the most promise.

Grass/Legume Pastures

The small grass/legume plots were grazed for the third consecutive season. This season 4-year-old steers were used. The plots cover two acres, and carried three steers for a period of 156 days.

The grazing days obtained are given below:—

Pasture	*Grazing Days*
Upright Panicum + Glycine javanica	156
Creeping Panicum + Glycine javanica	224
Nyasaland Napier + Glycine javanica	252
Bua River Setaria + Glycine javanica	276
Cenchrus + Vi-Vi	238
Cenchrus + Vi-Vi	244

The liveweight production per acre was 425 lb. and the daily rate of gain was 1.82 lb. per head per day. The rate of gain was lower than in the previous season mainly because of the age of the steers used. The older animals reached their peak weight before the end of the summer.

Windmill and Dam Blocks

During the dry season, 1954, 80 acres of old reverted land lying below the Windmill Block was stumped and ploughed and divided into four 20-acre fields which were seeded to the following grass/lucerne/dahl mixtures between the 1st and the 8th of December, 1954:—

Kazungula Setaria	with lucerne and dahl.
Katambora Rhodes Grass	with lucerne and dahl.
Bambatsi Panicum	with lucerne and dahl.
African Foxtail	with lucerne and dahl.

The dahl was drilled with a maize planter in double rows 3 ft. apart, with an interval of 30 ft. between the double rows. The grass/lucerne part of the mixture was drilled with a Hancock seed drill in the 30-foot space between the rows of dahl at a seeding rate of 8-10 lb. per acre in all cases.

Six acres of the south-west corner of the block had been seeded with lucerne in the autumn of 1954. This lucerne was not ploughed up, but was oversown with the new mixtures after discing.

In the Dam Block, where 60 acres had been stumped and ploughed during the dry season, 15 acres were sown with Katambora Rhodes Grass and lucerne on November 18th, 1954. The mixture was established before the first heavy rains fell, and for this reason no wash took place on this block. The four pastures sown in the Windmill Block in the first week of December were subjected to some very heavy rains which fell before and after germination.

The ease of establishment was notable in the case of both Katambora Rhodes Grass and Kazungula Setaria. The 15-acre Katambora pasture was grazed for the first time on March 4th, when the grass was in full flower. Grazing could have commenced at the end of January, by which time the grass was well advanced. The Kazungula/lucerne/dahl and Katambora/lucerne/dahl pastures were both well advanced and ready for grazing at the end of February, although grazing did not, in fact, commence until the 4th and 24th of April respectively. At this time a seed crop had already been harvested from the Katambora Rhodes.

In the Bambatsi/lucerne/dahl pasture the grass developed very slowly and had not advanced beyond the small stage by the end of the season. In the African Foxtail/lucerne/dahl pasture the development of the grass was faster than in the case of the Bambatsi Panicum but much slower than either the Katambora Rhodes or Kazungula Setaria.

All five pastures were grazed by the dairy herd with good results, and the grazed-over grass/lucerne/dahl pastures have supported a herd of 9 beef steers for the whole of the dry season.

Vlei Utilization

The grass/clover pastures established in the winter of 1953 were heavily grazed during the season 1954/55. The Wild White clover has since formed a dense sward, completely suppressing the grasses. Throughout the dry season these pastures remained green and provided some green grazing for cattle in the vlei. In view of the large proportion of vlei land in this region, these winter-green leguminous pastures are considered to offer greater possibilities.

Sub-surface Drainage and Irrigation

This scheme for investigating the possibilities of using sub-surface moisture in vleis for the growing of crops and pastures in the dry season, mentioned in our Annual Report for 1953/54, was completed in November, 1954.

The lay-out covers about 15 acres of vlei land, and consists of a system of herring-bone drains in which the direction of flow can be controlled, either to flow off as drainage or to be pushed back up the drains to provide sub-surface irrigation. The purpose of the system is to control the water table—an essential factor for the growing of dry-season crops in vleis. It was designed by Mr. R. Cormack, the Chief Conservation Engineer of the Department of Conservation and Extension, and was put down and managed with the co-operation of that Department.

It has already become apparent that several modifications are necessary before the system can function efficiently. More lateral drains are needed to give even irrigation, and for quicker drainage; the main drain, running straight down the slope of the land, is too small to cope with the water during periods of peak discharge; and the land has too many humps and depressions which should be evened out.

In April, 1955, part of the area was sown to a pioneer grass/clover mixture. Germination was good, but growth was patchy due to the uneven surface. This pasture was cut for silage for dairy cows, and it was afterwards grazed by sheep.

In the same month, 6 acres were sown with wheat, Punjab A, at the rate of 90 lb. per acre. A good stand was obtained, and the crop has ripened evenly except where the moisture was excessive.

Veld Studies

Cutting of Fertilized Veld (Experiment 50)

As reported in our last Annual Report, the application of ammonium sulphate at 600 and 900 lb. per acre had resulted in the killing of much of the grass on the plots concerned. In the past season the grasses did not recover on the plots, nor were they replaced to any extent by other invading grasses. The bare areas were largely covered by a weed *(Commelina kirkii)* which grew vigorously.

During the season the experiment was cut twice, and in the first cut the grasses and non-grasses were harvested separately plot by plot. The dry matter yield of the grass increased from 1,355 to 2,590 lb. per acre when the level of ammonium sulphate was increased from 0 to 900 lb. per acre, while the yield of the non-grasses rose from 340 to 1,290 lb. per acre at the same levels. Due to the nature of the rainfall the second cut was a very poor one, and it was not possible to harvest the species separately as in the first cut.

Grazing of Fertilized Veld (Experiment 66)

A study of the productivity of veld grassland in terms of grazing days with four levels of nitrogenous fertilization was continued. The composition of the sward is also being studied.

The camps were stocked from December 1st, 1954, to May 7th, 1955, a period of 158 days. The stocking rates were varied according to the amount of nitro-lime used, and the growth of the herbage. To check any differences in utilization, the camps were mown off in September, 1955, and the herbage weighed. The following table summarizes the results for the year:—

Treatment	Grazing, days per acre	Liveweight Production, lb. per acre	Average Gain/Day Original for Steers	Number of Original Steers	Total Unconsumed Residue, lb.
No fertilizer	53	93	1·75	2	1,588
300 N + P K	79	147	1·86	3	2,646
600 N + P K	100	152	1·52	3	3,207
900 N + P K	100	162	1·62	3	2,923

Continuous Grazing of Veld (Experiment 3)

This trial was started in December, 1946, and was laid down on an area naturally free from M'sasa and M'nondo. It was designed to study the effect of continuous grazing of veld at three different stocking rates, i.e. 10 steers in paddocks of 40, 60 and 80 acres each.

At first the camps were stocked in summer only, but in May, 1952, it was decided to keep the camps stocked for as long as possible into the dry season. The veld in the 40- and 60-acre paddocks has been markedly effected by the grazing. Grasses have been reduced in vigour, and those lower in the succession have become dominant. *Lophelina coriifolia,* an unpalatable shrub, has encroached to a marked extent, and some sheet erosion is evident as a result of the reduced cover.

The 80-acre paddock was not stocked after May, 1954, as the area was required for another experiment. The other two paddocks were stocked in May, 1954, and destocked in May, 1955. The average weight gains were 315 lb. from the

40-acre paddock and 329 lb. from the 60-acre paddock, or 78.7 lb. and 54.8 lb. per acre respectively.

The experiment as such has been terminated, but the 40-acre paddock is to be used for an isolation transect and to study the control of the *Lophelina*.

Veld Management Trial (Experiment 57)

A study of the "Three herd to Four Paddocks System" of veld management (in which burning is included) at three different stocking rates. This experiment is fully described in the Annual Report for the year ending 30th September, 1953.

The three stocking rates are 1: 14:, 1: 10 and 1:6. There are three steers in each treatment involving a total of 27 steers on 270 acres.

The camps were rested for a year in 1953/54 and subjected to the first of the four-yearly burns in October, 1954. All camps were stocked with 2½-year-old grade Africander steers in January, 1955, after a short post-burn rest. The camps will remain stocked for three years, destocked in January, 1958, allowed a full year's rest and burned in the following October.

Use of Fire for the Control of Coppice Growth in Veld Grassland (Experiment 52)

The burning treatments were carried out on the plots concerned on October 20th, 1954.

One half of each plot to be burned in October, 1955, was slashed in April, 1955, instead of in May as was done in 1954. This earlier slashing is more effective as an aid to coppice control as the coppice receives three setbacks—one due to slashing, one due to the frosts in mid-winter, and another due to the October burning.

Livestock

Routine testing for tuberculosis and contagious abortion was continued and no reactors found.

Dairy Herd. The dairy herd remained in very good condition throughout the year. The mature cows produced an average of 10,490.5 gallons of milk, and the heifers an average of 7,545 gallons of milk.

Three cows which appeared to be chronic carriers of mastitis were removed from the herd, and the incidence of mastitis fell rapidly as a result.

Shorthorn Herd. The herd has continued to improve during the year, and a 90 per cent. calf crop is expected.

In future the herd will be treated as an intensive beef herd to utilize grass leys and their products, as it has been shown that it cannot be maintained in a productive condition on veld alone.

Ranch Cattle. With the aid of silage or dried grass as supplementary feed, all the non-experimental cattle have been maintained in good condition.

Sheep. The policy of up-grading the flocks of Black-head Persian and Black-head Persian x Dorset Horn ewes to German Merino was continued. The ewe flock was supplemented during the winter and over the lambing period October/November, 1954. The average weaning weights of the lambs varied from 68.8 lb. from the half-bred ewes to 63.1 from the three-quarter-bred ewes. The growth of the lambs after weaning has been slow in spite of liberal supplementation. "Plane of nutrition" studies have been planned to determine the best way of overcoming this.

Milk from Grass. During the summer the dairy herd started grazing Napier Fodder on November 13th, 1954, and thereafter grazed on pastures of Katambora, African Foxtail, Star Grass, Kazungula Setaria, Katambora, African Foxtail and Bambatsi Panicum in that order. These pastures supplied maintenance grazing until May 15th, 1955, when silage feeding started at the rate of 20 lb. per head per day. The feeding of concentrates was based on the assumption that cows yielding 3 gallons per day needed no concentrates during the period of rapid grass growth, and that newly-calved, mature animals yielding over 3 gallons required supplementation after two gallons, and heifers after one gallon. The average daily production for the herd from November to May was 36.2 lb. of milk.

The liveweight of the cows increased from 1,192 lb. per beast on November 12th to 1,384 lb. per beast on May 13th. The animals went into winter in very good condition.

Irrigated Pastures. From September 29th to November 13th, 1954, the dairy herd grazed in the 4-acre irrigation scheme on the grass/clover mixtures. Starting with six cows, grazing for two hours a day, more cows were added until a total of sixteen cows were grazing the pastures. The cows received a full ration of silage and concentrates during this period, fed to them on a nearby Star Grass ley. The average milk production over the period was 24.3 lb. per head per day.

During the winter of 1955 the 4-acre grass/clover irrigated pasture was used for an experiment to determine the value of the herbage as a concentrate replacement.

It was decided that the herbage should be cut and soiled to the dairy cows, rather than allow them to graze the pastures. This obviated any reduction in grazing caused by fouling, resulted in complete utilization of the pasture, and enabled accurate records of individual intake and herbage yield to be kept.

In the feeding of the comparative rations a "cross-over" design was used in which each cow was fed every ration over a definite period. The rations were:—

A. Silage ad lib + 4 lb. balanced dairy meal per gallon of milk produced.

B. Silage ad lib + 2 lb. dairy meal and 10 to 12 lb. green herbage per gallon of milk produced.

C. Silage ad lib + 20 to 25 lb. green herbage per gallon of milk produced.

The actual quantity of green herbage fed was adjusted so that the animals were receiving 4 lb. of dry matter in this form per gallon of milk produced in the case of treatment C, and 2 lb. in the case of treatment B.

Records of the daily milk production, liveweight changes, dry matter intake and quality of the milk produced were made.

The trial has not yet been concluded and it is not possible at this stage to draw any conclusions.

Mineral Supplementation. Continuing the work in which the feeding of salt to ranch cattle is being studied, a trial was started in December, 1954, in which the feeding of salt to Sussex, Africander and Native cattle was compared. Each breed was divided into two groups, one of which received salt and the other had no salt. Apart from this the groups had the same grazing and supplements.

It was found that, by the end of summer, the salt-fed groups had gained at a higher rate than the no-salt groups regardless of breed, the Sussex group benefitting the most from the salt.

General

Seed and Root Distribution. Ninety sample packets of grass and legume seed were distributed during the year. Though much of the seed went to farmers in this country, samples were sent to Nyasaland, Kenya, Tanganyika, Australia, Israel, Gold Coast, Trinidad and Jamaica.

Only 469 bags of grass roots were issued, against 2,395 the previous year. The bulk of the issues were of Star Grass No. 2, much of which was taken by farmers who came with their labour and transport and dug it themselves.

Agricultural Shows. The theme of the Federal Ministry of Agriculture's Exhibit at the 1955 Salisbury Agricultural Show was "The Conservation and Use of Water".

The Station put on an exhibit in support of this theme, based on the production of dry matter and protein from a 4-acre irrigated winter pasture.

A large number of people showed interest in the exhibit and were able to discuss it, and other problems, with the member of the staff in attendance.

Assistance to Native Agriculture. There were fewer requests for advisory visits by the Department of Native Affairs during the past year. The visits were in connection with stocking rate assessments and veld management in Reserves. Nine visits were made in all.

Visitors. Visitors continued to attend the Station regularly. Many of these were farmers from the surrounding districts, but people came from other parts of the Federation, neighbouring territories, and from overseas.

The Grasslands Annual Farmers' Day was held on March 18th, and more than 400 guests attended.

PASTURE SUB-STATION, MELSETTER

The total rainfall for the season was 52.52 inches. October was a hot, dry month, and this, coupled with poor rains in the 1953/54 season (two months of which had no rain at all), caused some of the pastures to deteriorate. Good rains fell from November onwards, however, and conditions improved greatly as regards the growth of the pastures, and yields obtained were higher than in the two previous seasons.

Dairy Unit

The Dairy Unit has been expanded to 36 acres to fit in with an increase in size of the dairy herd. There are now 31 acres of dryland pasture and five acres of irrigated pasture.

Pastures. The dryland pastures consist of Kikuyu and *Paspalum dilatatum* both with and without clover, and Napier Fodder. The irrigated pastures consist of various mixtures of Italian Rye, Cocksfoot, Tall Fescue, *Phalaris arundinacea* and *P. tuberosa,* New Zealand Wild White clover and Chilean Red clover.

It has been proved, as a result of the last four years' work at the Station, that it is possible to maintain White clover in certain pastures under dryland conditions. Fourteen acres of Kikuyu and Wild White clover, established four years ago, has received only one application of nitrogen (200 lb. of ammonium sulphate) during its lifetime. It must be noted, however, that the extremely hot and dry climatic conditions experienced during the 1953/54 season, did cause some of this clover to wither and die, particularly in September and October, 1954.

Management. The Jersey herd has been run on these pastures under conditions which are normal and practical on the average well-managed farm. No effort has been made to investigate the highest possible yields which could be obtained from any individual pasture. This was done with the object of demonstrating the production of the pastures taking into account the practical problems confronting the dairy farmer, such as sick cows, low producers and breeding troubles.

Fertilizers. All grass clover pastures received one ton of lime, 300 lb. of superphosphate and 75 lb. of potassium chloride per acre during the season. Pastures without a legume received 300 lb. superphosphate and 400 lb. of ammonium sulphate per acre; the latter being supplied in two dressings of 200 lb. per acre.

The Napier Fodder provided valuable grazing in the early Spring, and was cut twice during the season for silage. The yield from the first cut was 11 tons per acre and from the second cut 15 tons per acre.

With the onset of the rains the Kikuyu grew well, as did most of the clover, but the Paspalum did not attain its usual standard, and much of the clover with it died. This latter pasture has been down for five years and is to be ploughed up for potatoes.

The irrigated pastures again proved their value, and during the dry season were strip-grazed day and night. Even with this system green grazing was not always available in the dry season, when Napier silage was fed with 2½ lb. of concentrates per gallon of milk produced. The cows regularly increased their production when changed from a silage/concentrate diet to grazing on the irrigated pastures. The irrigated pastures received no nitrogenous fertilizer during the year.

Production. From the dryland pastures the total production of milk was 53,667 lb. and from the Napier Fodder and concentrates 29,467 lb. The total production of milk from the irrigated pastures was 44,057 lb. The total production of butter-fat was 6,995 lb. with an average yield of 194 lb. per acre over the whole unit.

The yields of butter-fat from the dryland pastures were not as high as usual and this was due to a number of causes. In the flush months of December, January and February there were many dry cows in the herd, and very few in full production. Due to the effects of the unfavourable 1953/54 season, the summer pastures were three to four weeks later in coming away than usual.

The cattle in the unit had no access to veld grazing, and received concentrates only for a short period when Napier silage was being fed.

Trials and Experiments

Kazungula Setaria. Two strains of Kazungula Setaria — Nos. 185 and 1,193 — were cut twice for silage and yielded an average of 15 tons per acre. Yields from these grasses were not as good as those from Napier Fodder, but they were easier to handle, more economical, and they are more suitable companion grasses for legumes.

Love Grass (Ermelo strain) This has produced well during the season especially in early Spring. It is, however, rather unpalatable and of an inferior feeding value. It would be a very useful grass in eroded areas as it grows quickly on the poorest land and stabilizes any movement of soil.

Mount Elgon Star and Type C. Star. In January, 1955, these Star Grass pastures were disced and top-sown with Chilean Red and New Zealand Wild White clovers. The clovers germinated well in both pastures and the Mount Elgon Star/clover combination appears to be very promising. The type C Star Grass pasture was badly infested with Sheep Sorrel and was disced and top-sown a second time. The selective weed killer "Tropotox" will be tried on clover pastures as soon as possible.

Guinea Grass and Glycine javanica (Melsetter strain). The *Glycine javanica* seed was broadcast in the 1953/54 season and at the start of the 1954/55 season roots of the grass were planted into the then strongly-growing Glycine. The combination of the two species has been excellent with the legume tending to suppress the grass. The pasture received no nitrogen.

Lucerne. In January 1955, a trial was started in which the effects of various fertilizers and trace-elements on lucerne are being studied.

The lucerne, after germinating well and growing promisingly was badly attacked by Leaf Spot, and no yield cuts were taken. From observations it is evident that those plots in which the seed had been inoculated and to which lime and phosphate had been applied were the best. The two trace-element mixtures tested appeared to have no effect.

Veld Management Studies

Investigations into the effect of fire and mowing on scrub control have continued.

Burning annually in June has failed to be a practical treatment, and has accordingly been modified to include a mowing treatment. The burn every two years, in June, has resulted in a good, clean burn with little scrub, chiefly bracken, in evidence at present.

In a treatment mown as many times as possible during the season, with half the plot receiving 400 lb. per acre ammonium sulphate, the total season's yield for the unfertilized section was 4.2 tons of hay with 8 per cent. crude protein, the same figures for the fertilized section being 6.15 tons with 10 per cent. crude protein.

General

Among the 381 visitors to the Station were His Excellency Lord Llewellin, Sir Peveril William-Powlett, and Sir Gilbert Rennie.

The Station put on an exhibit at the Umtali Agricultural Show, and the Officer-in-Charge remained in attendance for the duration of the Show.

The Station held its Farmers' Day on April 15th when about 120 people attended.

MATOPOS RESEARCH STATION

Introduction

As Rhodes Matopos Estate remains Territorial, it has handed over all movable assets and a certain number of immovable assets previously used for research purposes, to the Federal Government and now leases the Matopos Research Station to the Ministry of Agriculture. The Station, together with Nyamandhlovu and Tuli Pasture Sub-station serves the medium rainfall and drier parts of the country.

Staff. Two posts still remained to be filled at the end of theyear, viz.: Senior Agriculturist and Farm Assistant. The new post of Technical Assistant in the Poultry Section will be filled on the 1st October.

Housing. There is an acute shortage of accommodation for single officers, and one of the married quarters is being used to house those for whom no accommodation is available in the Bachelor's Quarters.

A further block of 4 married quarters for Africans and the recreation hall, have been completed in the compound.

Weather. An excessively wet season was experienced this year resulting in as much as 54 inches being recorded in one of the Station's gauges. Many crop experiments were washed out, roads became impassable, streams and vleis developed in unexpected places and conditions generally were most unpleasant. Frosts were late but one or two very low temperatures were recorded which did considerable damage to private gardens and fruit trees.

General

The Officer-in-Charge visited research institutions in the U.S.A. from August to January. The tour was sponsored by the Foreign Operations Administration. Accompanied by two other members of the staff he also visited the Experiment Stations at Mara and Messina in South Africa.

Two courses for Extension Officers and two Farmers' Days were held during the year.

A recent innovation has been the formation of an Advisory Committee with two farmer members on it who can report back to the R.N.F.U. as to what

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research is being undertaken, and who can make suggestions with regard to future work, field days, etc.

The station contributed material to the Departmental Exhibit on the Bulawayo Agricultural Show.

Among the many visitors to the Station were the Prime Minister of Southern Rhodesia and the Minister of Mines, Lands and Surveys.

ANIMAL HUSBANDRY

Development. During the period under review favourable progress was made with regard to the necessary capital improvements for carrying out the new cattle research programme.

At Lonsdale two paddocks of 1,000 acres each were fenced off, the cattle kraals were enlarged and the dip was repaired. An additional fifteen acres of land was cleared of bush for crop production and a large shed was built for storing implements.

As Tonbridge and Enyandeni will revert to the Rhodes Matopos Estate in a few years' time, no major works were undertaken on these farms and capital outlays were limited to general repairs to fences, roads and watering points.

Cattle Breeding Experiments. The observations made on the first cross progeny of the long term breeding experiments in which Native and European cows are being graded to different breeds of bulls were published at the beginning of the year. From these results it is obvious that unless sufficient quantities of winter feed can be produced to maintain the exotic breeds there is no object in continuing the widely adopted practice of grading up the indigenous stock to any of the recognized British beef breeds to increase production.

There is much speculation as to whether sufficient quantities of feed can be grown locally to maintain high-grade commercial beef herds in winter, but considering the little success that has been achieved in this direction by farmers generally, it seems that better results may be obtained by selecting breeding stock on their ability to produce efficiently under existing conditions of fluctuating food supplies.

For the past two years bull calves have been selected on the productive abilities of their dams on free range and they will be progeny tested from the beginning of the 1957 breeding season. The progeny of these bulls will be compared with the offspring of purchased Africander bulls which have been selected according to stud book standards only.

Nutrition Standards. From available evidence it would appear that the low calving percentages obtained in beef herds on free range may either be ascribed to malnutrition and/or to incorrect breeding seasons.

In order to determine to what extent calving rates may be increased by feeding home grown feeds when the normal breeding season (February to June) is imposed, seventy-five cows have been fed maintenance rations for the past two winters. At this stage it is not yet possible to draw any conclusions on the effect of feed on calving percentages, but it may be pointed out that in spite of an exceptionally good season the progeny of the fed groups were at weaning approximately 20 per cent. heavier than comparable groups of calves reared on free range.

Steer Feeding Experiments. There is much speculation on the suitability of different breeds for fattening purposes. In order to determine the relative efficiency of food utilization between breeds, seven groups of calves of various breeding are being fattened. This experiment has just been started and should be completed in fifteen months' time.

Sheep Breeding Experiments. The sheep breeding experiments in which smooth coated mutton breeds are being developed from Blackhead Persian crosses are progressing favourably; and a number of individuals possessing the desirable mutton qualities have already been produced.

Dairy Research. A large number of tests were carried out to determine the accuracy of different types of lactometers for determining the solids-not-fat in milk. The results obtained show large differences between lactometers.

Poultry. An assistant Poultry Officer is resident on the Station and is responsible for all the specialized advisory work on poultry in Matabeleland. A properly equipped poultry section is being developed, as funds permit, on the Station, and is being increasingly used for demonstration purposes.

Development. Development has progressed well during the year. Major works include the following:—One block to house four Native families was completed at Two Tree Kop; a new pipeline was laid to the new Native Compound; water storage tanks were erected at the Two Tree Kop compound, Lonsdale, and in the Maleme paddocks; the run-off plot tanks were roofed and all the huts in the compounds were re-thatched and generally repaired. Several new huts were built.

A new Isolation Transect was fenced on Lonsdale and three 25-acre paddocks were fenced across the Maleme. All existing fences have been repaired and generally maintained.

During the rainy season a great deal of labour had to be diverted to road repair work, on both station and Road Council roads. Several new firebreaks and roads were made.

Veld Management. The veld management experiments have again given good results during the year. The mature steers were removed from the experiments in April 1955 and were replaced with 27-month old animals on the same day. The excessive rains that fell during the year masked many results that would otherwise have been obtained.

In spite of the fact that the grass growth was very good during the year the stocking rate experiments again showed up the need for veld to be stocked at the correct rate. At heavy stocking rates both animals and veld suffered.

The need for the employment of sound systems of deferred rotational grazing is emphasized by the experiments. It is becoming obvious that a lack of grazing management brings about deterioration in the veld. This effect becomes noticeable more quickly on veld types where grazing is selective. Throughout all the experiments the fact that sandveld is rather more resistant to misuse than is thornveld, is demonstrated.

Feeding of Urea. This year again, it has been shown that the cutting of hay is a very doubtful proposition if it is to be fed to steers in kraals without any extra supplementation. Very good results were obtained, however, by giving grazing animals access to stacked hay. Where urea and molasses were added to this hay the results were even better.

Urea and molasses when fed to steers in cob meal or when sprayed on the veld is giving satisfactory results and would appear to be a worthwhile proposition where adequate supervision of feeding can be maintained.

Scrub encroachment. Fire is proving very effective in controlling bush encroachment and in thinning out existing bush. The advantages of thinning out the bush are becoming plainly obvious in the experimental paddocks.

The burning experiments are showing the beneficial effects of burning once in three or four years right at the end of the dry season. They are also showing the ill effects of burning too frequently at any time of the year or of burning in autumn.

Experiments are being conducted to discover for how long combustible material continues to build up in unburnt veld. This has a bearing on the frequency of burning because if burning is to be carried out for bush control purposes a very hot fire is needed.

Very good results have been obtained from the use of goats. In five years a comparatively heavy goat pressure killed almost 100 per cent. of the coppicing tree stumps in the goat paddock. Perhaps more remarkable was the fact that the grass cover in the paddock actually improved during the course of the trial.

Work is being carried out on the use of hormone spray of 2-4-5T for the control of bush. A preliminary trial gave fairly promising results but proved to be uneconomic at present day prices.

Fertilizing of Veld. Veld fertilizer experiments which have only run for one year gave the following results:—On black soil the increased yield from 600 lb. ammonium sulphate per acre amounted to only 0.34 tons dry matter per acre. Heavier dressings gave no increased yield. On red soil the increased yield due to the same amount of ammonium sulphate was 0.43 tons dry matter per acre, no additional increase being obtained with heavier dressings. On sandveld the results were more encouraging, an additional 1.79 tons of dry matter per acre being obtained from 900 lb. ammonium sulphate per acre. 300 lb. of the fertilizer more than doubled the yield of the control plots which produced 0.79 tons dry matter per acre.

Planted Pastures. Five strains of *Panicum* and *Cenchrus ciliaris* are proving to be the most successful of the shorter grasses in so far as yield is concerned.

In a variety trial which has run for six seasons these grasses gave their best yields in the year under review.

Several methods of rejuvenating a worn-out stand of Napier Fodder were tried out. The most successful appeared to be to plough deeply between the rows and to apply 300 lb. per acre of ammonium sulphate in bands next to the plants.

Cutting Napier Fodder more than once a season depresses the yield of total dry matter considerably but results in greater yields of crude protein.

Irrigated Pastures. The irrigated pastures are proving very successful when strip grazed by dairy cows. A mixture of *Phalaris arundinacea* Chilean Red Clover and New Zealand Wild White Clover produced approximately 1,625 lb. crude protein per acre over the last twelve months. A mixture of Tall Fescue and the same two clovers produced approximately 2,125 lb. crude protein per acre in twelve months. This figure is exceptionally high—in Europe the figure is about 800 lb. for high quality pastures.

Measurement of Run-off and Erosion. The run-off experiments indicate that more soil is lost from veld burnt in autumn than from any other treatment except one in which the ground is kept free of all vegetation. In this treatment losses of both soil and water are enormous. Differences between the other treatments are not yet apparent.

General

Veld management experiments have been started in the Fort Victoria area in co-operation with, and at the suggestion of the Department of Conservation and Extension and the local I.C.A. Committee.

The co-operative veld management experiment in the Prospect Native Area is producing good results, but the one in the Nata Reserve has been abandoned as adequate control could not be exercised.

A large amount of advisory work was carried out during the year and a host of visitors from both within and without the Colony were conducted around the experiments.

A large amount of planting material of grasses was distributed to farmers during the year.

Field Husbandry

Maize Variety Trial. This experiment was laid down on both a heavy soil and sandveld, but due to water-logging the sandveld results were discarded. Best silage yields were obtained from hybrid 52DH32 (26.43 tons/acre); Potch Pearl (23.47 tons/acre); Kroonstad Robyn (23.02 tons/acre); and Kalahari (22.13 tons/acre). Best grain yielders were hybrid 52DH29 (30.49 bags/acre); hybrid 52DH32 (26.83 bags/acre); Kalahari (22.80 bags/acre); and Potch Pearl (22.42 bags/acre).

Maize Fertilizer Trial. This trial was also laid down on both a heavy soil and sandveld. Sulphate of ammonia increased silage yields by only 2.76 tons per acre on the clay, and 0.83 tons per acre on the sandveld, for every 375 lb. per acre increase in fertilizer application. No response was shown to superphosphate and muriate of potash. Moderately heavy fertilizer applications did not increase grain yields either on the clay or on the sandveld.

Maximum Yield Trial. Laid down on clay soil to determine maximum yields of maize, water and fertilizer being optimum, at three population levels. Plots were heavily fertilized, received supplementary irrigation, and were planted to Sahara maize. Results, which do not differ significantly are as follows: Spacing 3 ft. x 18 in.—30.83 bags per acre. Spacing 3 ft. x 9 in.—33.92 bags/acre. Spacing 3 ft. x 6 in.—35.56 bags/acre.

Sorghum Variety Trial. Sixteen varieties were tested for grain yield on a fertile clay soil. Highest yielders were Rustenburg (5.43 bags/acre); 5152 (5.16 bags/acre); Early Hegari (4.70 bags/acre); 5164 (4.56 bags/acre); and Plainsman (4.11 bags/acre). These results do not compare with those obtained during drier seasons.

Sorghum Fertilizer Trial. Laid down on a fertile clay soil, and tested with variety Plainsman. No response was observed to sulphate of ammonia or superphosphate. An application of 50 lb. per acre of muriate of potash increased grain yields by 0.61 bags/acre, and a further application of 100 lb. per acre increased grain yields by 1.36 bags/acre. This response to potash is abnormal.

Millet Spacing and Time of Planting Trial. Seven different spacings were compared with two dates of planting to determine the effect on silage yields. October planting was significantly better than November planting, and the closest spacing 7 in. x continuous, was significantly better than any other spacing. These results correspond with those obtained in a similar trial during the previous season.

Silage Mixture Trial. Sorghum, millet and maize were interplanted with legumes and tested for silage yield and nutritive value of the ensilage. A mixture of Haakdoorn sorghum and G4 cowpeas gave the highest yield per acre (26.62 tons), and also the most favourable analysis.

Sandveld Fertility Trial. To determine the effect on soil fertility, as measured by crop yields, of kraaling cattle on arable land during the winter months before planting. Kraaling 15 beasts per acre did not produce a significant increase in yield over the control plot where no cattle were kraaled. The application of fertilizer proved better than kraaling cattle as a means of raising soil fertility.

Crop Rotation Trial. To investigate the effect on soil fertility of 14 crop treatments, including three and four-course rotations, grass cover, fallow, and continuous cropping. This trial has been in progress since 1951, but no results can be put forward until such time as test cropping has taken place during the 1955-56 season.

General

(a) The abnormally heavy rainfall experienced during the season was most unsatisfactory for field experimental work. Poor germination, bad stands, and severe waterlogging led to several trials being discarded.

(b) Demonstration plots of dwarf non-shattering castor beans were planted and yielded best (1,500 lb. seed per acre) on heavy well drained clay soil.

(c) Velvet beans, cowpeas, sunnhemp and sunflowers were planted for seed multiplication purposes.

(d) Breeding work was continued on sorghum, maize and millet.

(e) Advisory work was carried out as usual, and many farmers inspected the work in progress.

NYAMANDHLOVU PASTURE SUB-STATION

Weather. There was an exceptionally hot spell in October, during which the maximum temperature rose to over 100°F on several occasions. This station missed the preliminary planting rains, but was inundated later by the wettest season known, 35.73 in. being recorded. The winter was very mild, and with the exception of the Chesa Valley, no heavy frosts occurred.

Veld Management. In the veld management trials, the effect of the poorer treatments have been masked by the abundance of grass, and on the land, yields were low because of flooding and insufficient sunshine. Results from the grazing trials are much the same as in the past two seasons.

On the Kalahari sand, the trials incorporating burning for the control of bush and improvement of the grazing again show the best animal weights. Due to the abundance of grass excellent burns were obtained, and many large trees, especially *Terminalia sericea* and *Burkea africana*, were nearly killed. All the smaller bush was knocked out by fire, and is having to coppice from ground level. It is hoped to lay out replicates of these trials on more typical veld in the coming year, which should greatly enhance their usefulness.

On the black basaltic clay, hay yields of 1.77 tons per acre were recorded off the veld. The 30-acre mowing paddock is a source of embarrassment in that the baling and weighing of the hay requires a lot of time and labour which could be better occupied elsewhere. In future, a 10-acre block within the paddock will be utilized for recording the yield of hay. Because there is now so much grass in both the cleared and browse camps in Experiment 14, the cattle on the browse are doing almost as well as those in the cleared paddocks. On balance, though, since the inception of this trial, there is a clear difference in favour of the removal of bush. The results obtained from this trial to date will be written up for publication at the completion of the current grazing cycle.

On the black clay, the winter stocking rate has been estimated at 1 large beast to 10 acres. That this is substantially correct is shown by the lower weights obtained when grazing at 1 beast to 4 acres, as in Experiment 18. This difference should be even more marked in poorer seasons.

Continuous grazing of red sandy loam veld for cycles of 3 years, with a rest break and a burn in the fourth year, is proving superior at present to deferred rotational grazing for animal nutrition. It is anticipated though that this difference, which is small, will be gradually minimized by the effect of the selective grazing which any system of continuous usage will probably foster. There is however, little doubt that this system, which requires only 4 paddocks for the support of 3 herds, will prove the most popular on all farms in the initial stages of their development.

Couch Pastures. Perhaps the most useful items of information that have emerged in the period under review are those concerning Couch Grass (Cynodon dactylon). It has been shown that this grass has a carrying capacity several times that of the natural adjacent veld, but final assessment will not be possible until more normal seasons have been experienced. On an old land with a red sandy loam soil, which was abandoned to couch after 25-30 years of cropping with no fertilizer, a stocking rate of 1 beast to 6 acres is giving liveweight returns nearly comparable to those on the adjacent veld where the stocking rate is 1 beast to 20 acres overall (inclusive of the area reserved for burning) or 1 to 15 acres of actual ground available for grazing. This work is to be expanded with fertilizer treatments, but at this stage, due to the high cost of nitrogenous fertilizer and the low rainfall, it is doubted whether any annual fertilizer programme can be a paying proposition.

Germination tests on dung from steers grazed on couch show that the seeds of this grass are passed through cattle in a viable condition. This is something which has hitherto been suspected, but apparently not previously demonstrated. This knowledge will allow of better control of couch when it is desired to keep arable lands clean, and also suggests means whereby couch can be encouraged on old lands.

This Station is co-operating with the Department of Conservation and Extension in starting a co-operative experiment on a farm to obtain data regarding sheep on fertilized and unfertilized couch. It appears that sheep are likely to be far more remunerative than cattle and that they may be the logical means of utilizing such couch as is available.

As couch grass comes in so readily in this area when the lighter soils are ploughed, and can so greatly enhance the productivity of a farm, it appears that a scheme which involves clearing fresh lands at frequent intervals, utilizing them for cash crops for a few years to recoup the costs of clearing, and then turning them over to couch, is one that merits serious attention.

Veld Hay. In the trials designed to compare the effect on cattle of grazing on veld in winter versus being fed with hay in pens, the results have again been strikingly in favour of the winter grazing and show that for the area served by this Station, where the hay yields are normally fairly low, the making of hay does not appear to be justified except in certain special cases. It is realized that in drier years, where there will be less grass available for the cattle to choose from, the difference will not be as marked as at present. The greatest differences are in those cattle running on, or being fed hay from, the black basaltic clay.

Veld Studies. The ecological experiments on the red soil are now beginning to show results. One of the most interesting is the suppression of *Themeda* in favour of *Heteropogon* on plots burnt at more frequent intervals. At this stage (after 7 years) there is still very little difference in regard to plant density on those plots burnt at 2, 3 or 4 year intervals, but on the annual burns, the perennials have been thinned out considerably, especially on the early burns.

Quelea Investigations. Pressure of duties on this station, and lack of mileage, has handicapped investigations in the biology and status of these birds. One visit, however, was paid to a breeding colony near Fort Tuli (one of many in the area in February) for the purpose of ringing chicks. Trapping and ringing of birds continues on this station. The finding of two dead Queleas in the Orange Free State this year carrying Rhodesian rings has now supplied the proof that there is an interchange of population between this country and the Union, in addition to that previously known between Southern Rhodesia, Northern Rhodesia and Nyasaland. Queleas do not appear to have been troublesome this season in the European farming area, due to sufficiency of food keeping them in the lowveld.

TULI PASTURE SUB-STATION

This Station, situated on the Tuli Native Cattle Breeding Station south of Gwanda, has been developed in co-operation with the Department of Native Agriculture and serves the lowveld ranching area. The Native Department finances the Station and provides a Land Development Officer to carry out the routine supervision of the experiments. The planning, scientific work and interpretation of the data is the responsibility of the Matopos Research Station. The programme of work is restricted to the conservation and utilization of the natural grazing, the basic problem of the area.

The rainfall for the season was 36.02 inches as compared with 11.57 inches last year.

Veld Management. Veld management experiments have now been functioning for 2¼ years. After 18 months in the experiments the first batch of 3-year-

old steers was slaughtered on the 7th January, 1955. Thirty per cent. were graded Rhodesia Best and 47 per cent. were 4-tooth. Average warm dressed weight was 524 lb. On the 3rd January, 1955, one-year-old steers were put in the experiments at an average live weight of 400 lb.

There are five major veld grazing experiments covering an area of 1,620 acres and designed to supply information regarding stocking rates, systems of management, effect of fire, and the relative merits of grass and browse plants.

Steers at 1 beast to 10 acres were again considerably lighter and were the only ones to show an appreciable dry season loss of weight. Steers at the lighter stocking rates received maintenance from the veld until about the middle of October. There was a short but sharp loss in weight in November but the middle of December liveweights were back to the mid October level.

Alterations to the existing programme will be made in October/November, 1955, when herds will be made up of various age groups and the interval between stocking rates will be reduced.

Burning Experiment. This is a new experiment and will consist of 1 acre plots which are burnt at intervals of 2, 3, 4 and 5 years.

Herbage Samples. The monthly collection of six browse and two grass samples started in December, 1953, was discontinued in January, 1955.

Bush Control Trial. An investigation is being made of the effects of 2-4-5T on several tree and shrub species. In addition 17 acres of coppice was also sprayed. The first observations will be made early in the 1955/56 season.

Proposed Experiments. It is intended to put down an Isolation Transect experiment and a grazing experiment involving the use of goats as soon as fencing materials become available.

SABI VALLEY EXPERIMENT STATION

A good year is reported, in spite of a wet rainy season and damage to maize and wheat from rust, which on the latter would have been catastrophic if the Valley had been a National "breadbasket". The serious damage sustained to wheat in the Valley is more good than bad, as it points up immediately the need for an intense and aggressive programme of wheat breeding to produce varieties which will prevent major losses occurring in the future.

The highest maximum temperature so far recorded at the station was reached in October at the beginning of the year under report, when the thermometer touched 109°F. Higher temperatures were recorded the same day at other stations in Rhodesia. A light frost occurred in August, unusually late for the Valley.

The airstrip has been finished and is well liked by pilots. But the road into the Station is being hammered mercilessly during the wet weather by trucks and lorries moving to and from the Native Lands further down the Valley. As it is a private road, it is proposed to divert such traffic during the coming season over the public road through Rupisi.

The domestic water supply is still uncertain and water being rationed, but the electric power supply is satisfactory and the promise of a qualified Staff mechanic to start November removes the maintenance worry.

The hay drying barn is well under way, as well as two more housing units, and the irrigated pasture block. The Development Farm, another step in the implementation of the Sabi Valley Irrigation Project, is also nearly complete, with the house and barn finished and the first of the lands ready for cropping.

The Station still lacks a soils physicist, and basic investigation into the effects of irrigation farming on soils and soil management lags far behind agronomic investigations. The Soils Chemist is transferring to another Station; his place will be taken by a Junior Professional Officer pending the appointment of a soils physicist.

Maize. Experimental crops were in general not good, partly as a result of water-logging to some extent on some lands, attacks of rust on all maize, and too low a nitrogen supply. Mean yields from the rotations were fair, averaging about 18 bags per acre. The rotations are new and have not settled down yet, but they come nearer than any other of the Station's work to being a reasonable reflection of what a farmer may expect. It is pointed out repeatedly that best results from maize in the irrigated Valley cannot be expected until strains more closely adapted to valley conditions than those now at hand are produced. Indications from the breeding trials are good, but it will be at least two years until any quantity of Sabi hybrid seed is available.

One of the best maize experiments was on the metered water plots, where the mean yield for all plots was 25 bags per acre, with a high of 40. Observations on this experiment were responsible for the conviction that 30 pounds of nitrogen on maize is not enough in the Valley, and that 50 lb. of nitrogen per acre would be prescribed for all plantings next year. Machine cultivation proved significantly better than hand cultivation for the maize crop. Of special interest was the discovery of one immune or very highly rust resistant strain of maize among a collection in the rust trials. An attempt will be made to locate the source of the seed, and to incorporate the characteristic into the new Sabi inbreds.

Lucerne. The crop continues to do well, except for a tendency to fail in spots in its third year, allowing the encroachment of the aggressive local grasses. A number of different experiments are under way to study the problem, but it is not one that will be solved quickly. It is thought that one powerful factor in stand vigour and longevity will be found to be the interaction of season and planting time. Genetic variation may be another. Soil variation is certainly a third. The testing of new varities continues. To date only those from the hot irrigated sections of the United States have done conspicuously well; in addition to Hairy Peruvian and India, the new variety "Caliverde" is looking very promising indeed.

Hunter's River from Australia has done moderately well at the Station, but while it makes good hay if cut soon enough, it goes to pieces very rapidly from rust if it gets in the least over-mature, and has not set seed at all. It is hoped to initiate a lucerne breeding programme at the Sabi Station next year, with high rust resistance one specific objective.

Cotton. Of all the crops at the Sabi Station this past year, cotton did far and away the best, with a top yield of up to 4,500 pounds of seed cotton per acre and one whole experimental planting averaging 3,500 pounds. The only nutrient that has so far produced any significant increases in yield has been nitrogen, where its use on poor land was shown to be highly economic. This confirms experience with almost all other crops at the Station.

Date-of-Planting experiments continue to advance the optimum seeding time, which is now set at mid-November. But the problem of the cost of insecticides for the very early plantings is now coming under investigation, as it may have considerable bearing on the economics of the early crop. Further insecticide trials verified last year's indications that 50 per cent. of the crop, or more, could be lost through inadequate protection or none at all. Costs of protection are still high, although abundantly worthwhile; next year's work will be in the direction of looking for cheaper and more effective control.

Again the driest of the moisture-level plots gave the best yields. It was shown that this year, with rainfall nearly ideally distributed, the 16 inches received during the course of the experiment would have produced a 2,500-pound yield, once the crop was up. No difference in favour of ridge planting was recorded, yields favouring the simpler planting method, which will be generally specified for Valley conditions.

Until further research changes the picture, also recommended highly is the standard cotton dust mixture of 10 per cent. DDT 3 per cent. BHC for insect control. If red spider appear, their control may be accomplished by Melathion.

It is pointed out that cotton is not only important as a fibre resource, but also as a source of edible oil, and a very valuable livestock feed concentrate.

Wheat. This was as bad a year for wheat as it was good for cotton. Throughout the Sabi Valley rust infestation had to be seen to be believed. It is emphasised that until a plant breeder combines the best qualities of existing strains having a high adaptive index for Valley conditions, with rust immunity or a very high degree of tolerance to the disease, progress in wheat culture in the irrigated lowveld must remain practically non-existant. Some new varieties performed very well considering the season; one apparently immune strain appeared in this year's collection of varieties which if it is truly immune to the local rusts, offers the ideal starting point to a plant breeder in beginning the development of new strains for Valley production.

Last year seeding rates from 40 to 120 pounds per acre produced no difference in yield; this year starting much lower at 15 pounds of seed per acre, statistical differences in production were measured. It is indicated that 45 lb. per acre is a probable seeding rate for best results, and until later tests prove otherwise, that will be recommended. It was demonstrated that where wheat followed lucerne, under this year's conditions at least, yields were as good without the addition of nitrogen as where 50 pounds of the element were used on wheat following maize. In a nitrogen experiment on the Mopani Farm, 50 pounds applied in the boot stage gave higher yields than fifty pounds applied with the seed. No response to any fertilizers, including minor elements, other than nitrogen has been yet demonstrated on lands longest under irrigation at the Sabi Station.

The time-of-planting experiment this year showed no significant difference in yield between the 15th April seeding and the 1st May seeding, but highly significant reductions in yield occurred in later plantings. Last year's 15th May planting did as well as the 1st May seeding; this year's yielded only about a third as much as that planted 1st May. It is likely that the nearer one can plant to 1st May, the better will be the expectation of maximum yields, other conditions for good crops being fulfilled.

In the variety test, the only one of the old varieties in use at the Station which did well was "Burbank" known in the Valley as "Smooth Nyanyadzi" from its appearance in the field and the source of the seed. Outstanding new strains for yield under this year's stringent conditions in their order of production were:— 261 RFC 1B, B 253, Warigo, Burbank, Huembo x 2-50, Kruger, 261 S10 C 20, Kruger mocko, Huambo x 14-51 and Grenadero. Yielding about half as much as these, but still with the "also-rans" was the variety "Regent" that showed *no rust infestation at all.* It was the only one that appeared immune, and it is most unfortunate that the rest of its genetic complex is unadapted to Valley conditions. The variety Sabi X - 1 that appeared so attractive last year is susceptible to rust, and did no better than most of the rest. Neither of the two wheat experiments on the "metered water plots" have produced any really worthwhile data, but both have opened up new prospects for further research.

Sorghum. Nothing was done with this grain during the past year at the Sabi Station.

Rice. Of the 42 varieties in the original collection, only one promising one is left, known as Amberikore. It is short-strawed, lodge-resistant, quick-maturing, yields well and ratoons well.

Fibres other than Cotton. There was no reason for doing any work in this category during the past year.

Vegetables. There was no experimental work done with vegetables. They have been profitable in the hands of private operators in the Valley, and nearly everything tried has done well in season in Station vegetable gardens.

Fruit

Pinapples. Good-quality fruit of large size and attractive appearance has been produced at the Station but yields have not been impressive.

Bananas. With nitrogen fertilization, this has become a most promising fruit for Valley production. Bunches of excellent fruit of up to 90 pounds are now being harvested, and from the better methods of handling an annual production of about 1,000 bunches of 50 lb. or more seems certain.

Citrus. Promising.

Dates. Three trees in green fruit, more expected to bloom and set fruit next year, no estimate of possible performance can be made yet.

Miscellaneous Crop Trials. A number of studies of green manure varieties and production methods has been put under way. None so far tried has equalled sunn hemp for all-round use, but sunn hemp stem rot disease has appeared at the Station and is causing serious concern. The testing of other types of plants, and the search for new varieties continues. Dolichos bean offers some promise but a lot of selection work will probably be required to adapt it more closely to Valley conditions.

Grasses. Napier grass has done well, yielding about 60 tons of green weight per acre per year, under rather close cutting, on poor soil, but with substantial nitrogen topdressings. Rompha Grass looks good, and it is hoped that it will be possible to try this in combination with alfalfa in at least one of the irrigated pasture plots.

Sugar Cane. The cane at the Station has produced well, yields ranging from 6.5 to 12.5 tons of sugar per acre. Best yields on new cane were from 3 American introductions, which have been approved by the Department for dispersal.

Flax. Not yet harvested, but appearances good.

Plant Selection and Breeding. It is emphasised and re-emphasised that until a plant breeder is available to work on a number of the Valley's problems, little further progress can be expected.

Soil Chemistry Laboratory Studies. A study was made of the effect of sub-soiling as a part of the treatment for preparing a maize seedbed from wheat lands. Basic treatments were ploughing, discing and no cultivation; each of these was split for sub-soiling. There was no statistical difference in production from the basic treatments, but there was a highly significant difference in production in favour of the subsoiling treatment.

Water Requirements and Fertility Studies. These studies are conducted on the "metered Water Plots", which are set up so that water can be pumped on to individual plots through a flow meter and portable aluminium pipe.

Three experiments have been finished; two of wheat and one of maize. Both wheat experiments have failed to yield conclusive results, the first because it was planted too far out of season, the second on account of the onset of rust. Results from the maize trial showed that with 60 lb. of nitrogen, 30 on wheat crop residue and 30 on the maize at knee-high, a plant population of 14,500 produced a mean yield of 26 bags of grain per acre; when the population was raised to 23,300 plants, the yield dropped to 19 bags per acre. At the higher population, another 60 lb. of N. produced 28 bags per acre. The experiment was severely attacked by rust; if the reduction in yield was as much as 25 per cent. which it was shown to be in "rust and yield" trials in another experiment, it is possible that a mean yield of the order of 40 bags per acre could have been realized. Yields from the "low" water level of 15 inches applied in addition to 16 inches of rain were as good as, or better than, yields from the high water level where 27 inches of irrigation water was used. There was an indication that the irrigation history of the previous wheat crop may have had a sizeable influence on maize yields. On account of rain no real water stress was ever felt by the maize crop, even on the "dry" plots.

Soil Physics. A soils physicist was on the Staff for two months, but left because of the dissatisfaction with his terms of employment. During his stay some preliminary work was started on the crusting of the Station soils, one of the Valley's most serious problems producing mostly negative information. It was stated that substantial additions of organic matter to the soils should help solve the problem, and the suggestion made that application of sulphur should also be tried. He showed some interesting correlations between a number of known physical constants for soils and the various soil groups in the valley, in a table covering a few preliminary soil samples taken in the area. A development of the physical studies, and an extension of them into the management problems of the lowveld irrigator, is a very urgent requirement for the success of research at the Station.

The Animal Factor in Irrigation Farming

Dairy Production. Milk production and the development of the Grade Jersey herd at the Sabi Station has been satisfactory. A group of 5 nice heifers from the Station registered bull are ready for breeding, and will be taken to a neighbouring Estate for service by a registered Jersey. By this time next year a preliminary estimate of the value of the Station bull as a milking herd sire may be possible. Several of the cows have now been through a complete lactation on the Station; the best produced a total of 9,325 lb. of milk, the poorest 4,834.

Beef Management Studies. An irrigated pasture block is under development, on which it is hoped some beef studies may be made. There is doubt in some minds about the value or practicability of irrigated pastures for the intensive irrigation farmer.

Sheep Husbandry. It is proposed that a start be made at the Sabi Station in a study of the economics of sheep feeding in the Valley. The mutton produced here is good. It is also possible that a nucleus herd of an adapted type could be built up, as a source of breeding material for any irrigation farmers who want to run a small herd as part of their farming operations, and for a convenient meat supply.

Poultry Husbandry. Poultry continues to do well at the Station.

CHEMISTRY

During the past year there has been a very considerable increase in the number of samples analysed, particularly on soils for fertilizer recommendations. We confidently expect these numbers to expand indefinitely because in matters of soil fertility the Chemistry Branch is generally recognised as having achieved a special status. There is no question that not only is our soil testing technique the best in Africa, but it is not bettered anywhere in the world. Because of its importance and its cost, nitrogen has been studied in particular detail, and the work which has been done on nitrification and nitrogen availability is of the very greatest importance. As a result, the Branch is able to make fertilizer recommendations for all crops which combine maximum efficiency with minimum cost. The introduction of incubation as a standard measure of nitrification, which has given so much greater precision to soil testing, has involved an additional determination and has required the full services of a professional officer. We have been encouraged by the commendations we have received from farmers and by the spectacular increase in the number of soil samples brought in.

But this success has not been achieved without its consequential problems and the congestion in the laboratories, the accumulation of samples and the delay in reporting on them are becoming serious and are as sore a trial to the staff as to those anxiously awaiting their results. But there is now hope that both the congestion and the necessity for time-consuming clerical work, to which attention was drawn last year, may be soon relieved. Plans have already been drawn and approved for a new soil testing laboratory as part of a larger building, on which work is scheduled to start in the near future.

In the coming year there will have to be a serious restriction in the number of pasture research samples which can be analysed in the laboratories. The numbers, already heavy, have shown a further advance and work of considerable importance on digestibility has been started. It is to be hoped that the provision of facilities at the research stations for the determination of moisture and protein, which can no longer be delayed, will free the Pasture Research Chemist for the co-operative fundamental research for which he is fitted.

The work of the Soil Survey section has this year been more diversified than ever. Apart from the irrigation surveys now accepted as normal, very important work has been done on Sandveld soils, including a survey of the Trelawney Experiment Station. Co-operative work with the Department of Conservation and Extension on land capability classification for proper land use has been started, and the major soils of the country re-examined to see how they fit into the proposed American soil classification system. This work has been undertaken at the request of Dr. Kellogg, who has selected our Soil Survey Section as one of a team of collaborators. Co-operative work on the selection of suitable soils for small-scale irrigation schemes has not proceeded on the scale which was anticipated.

In spite of the great pressure of routine and advisory work a considerable amount of research and investigatory work was undertaken during the year and a record number of samples handled. Most of the research projects are showing results and a period of consolidation is now required for the collation of all available data and for the publication of much of it in scientific journals, as well as for the revision of the tentative tables for the calculation of fertilizer dressings from analytical data which were prepared earlier.

Demonstrations were arranged during the year on water analysis in connection with courses under the direction of the Chief Fisheries Officer, and lectures on soils and the irrigable value of soils were given to officers of the Department of Conservation and Extension. Many talks were given at Farmers' Days and to Farmers Associations and numerous visits were paid to the Research Stations in connection with co-operative work. Many visitors were welcomed at the Laboratories and we maintained our close and cordial relations with the other officers of the Department, with those of the Department of Conservation and Extension, the Departments of Meteorology, Irrigation and Geology, the Surveyor General's Department, the Department of Native Affairs and others.

During the year the Chief Chemist returned from his visit to the United States of America, which was arranged under the auspices of the Foreign Operations Administration.

Laboratory Analytical Work

The following table gives a classification of the samples analysed during the year under review, together with those of the previous year (1953/54).

	1954/55	1953/54
Soils	2,570	1,809
Manures and Fertilizers	310	239
Farm Feeds	144	181
Waters	158	397
Vegetable Products	235	218
Limes and Travertines	4	9
Toxicological	565	484
Meats	16	11
Miscellaneous	228	334
Pasture Research	1,443	1,201
Investigatory and Research	1,123	680
Soil Survey	350	206
TOTAL	7,146	5,769

It will be noted that the number of samples this year shows an increase of 1,377 or 24 per cent.

Not included in the above summary are 210 litres of Standard iodine solution prepared for the Veterinary Department, and 10 litres of Standard Caustic Soda Solution for the Dairy Branch.

In addition, some one thousand interviews were given to farmers and other visitors in connection with the analysis of samples, fertilizer advice and other matters.

Soils for Advisory Work. Samples under this heading have increased by 761, or 42 per cent. as compared with the previous year; for its effect in any one particular season this method of reporting is not ideal as it covers two growing seasons. As in previous years tobacco was the dominant crop accounting for 1,196 of the samples, but other crops showed a relatively greater increase. In addition to maize and similar better known ones, other crops included pastures, forests, tea, sugar cane and turf for sports fields.

Manures and Fertilizers. This group showed an increase of 30 per cent. over 1953/54. As in the previous year the increase was due to the increase in guano samples which, directly or indirectly, accounted for 258.

Farm Feeds. In this category fewer samples were analysed than in the preceding year. Of these 28 samples were taken under the Act, and most of the others were sent in by manufacturers and sellers prior to registration or as a check.

Waters. The large drop in numbers of waters, mainly from the Ngesi Dam for silt content, emphasises the inability of the Branch to carry out large numbers of routine samples for Government Departments during the rush season. Many samples which were submitted have not been analysed. It is hoped that much of this work in future can be carried out by the Hydrographic Branch of the Irrigation Department.

Vegetable Products. Included in this heading were grain samples from the Salisbury Experiment Station, tobacco leaves for correlation between chemical composition and quality, and grasses, hays, silages, lucerne and other fodders for feeding value.

Limes and Limestones.—These continued at a low level.

Toxicological. Of the 565 samples under this head, 494 were post-mortem specimens, of which 227 proved positive. Arsenic was still the most common poison but numerous other poisons were tested for. "Veld poisons" could not be tested for, partly for lack of precise information, partly for lack of time. Fertilizer poisoning is frequently suspected but seldom confirmed and the dangers may perhaps be over-emphasized.

Meats. The samples from Henderson were analysed for protein moisture and fat in connection with nutrition experiments.

Miscellaneous. This group included 146 samples of pig fat from the Pig Industry Board, ox gall and Neatsfoot oil from the Cold Storage Commission, tobacco from irrigated and non-irrigated lands, table salt, sawdust, vermiculite and thermometers for calibration.

Soil Survey

Maps and reports were prepared for the surveys of the proposed Hunyani Poort Irrigation Scheme and the West Bank of the Sabi River from the Devuli to the Turgwe. Two separate maps were drawn for each investigation, one showing irrigability classes and the other the pedological classification based on morphological and genetic characteristics. This marked a very considerable advance in presentation and recording.

In addition to the necessary laboratory work for these reports 122 samples from the erosion experiments at Henderson were analysed.

An investigation for the Chirundu Sugar Estates of land at Gwembe in Northern Rhodesia, which had abortively started in January, was completed when the weather was more propitious, and at the same time a detailed soil survey of the Trelawney Tobacco Research Station was carried out at the request of the Tobacco Research Board.

Three broad reconnaissances of large irrigation projects were carried out for the Southern Rhodesia Native Affairs Department and several smaller ones for the Department of Conservation and Extension. The joint procedure for these small scale irrigation investigations is not sufficiently clear cut, and requires further definition and clarification.

In collaboration with the Department of Conservation and Extension, very interesting and important work has been done on farm planning; using the procedure universal in the States soil surveys have been made on two farms as a basis of land capability classification. The findings have not yet been jointly reviewed and it is too early to draw conclusions.

During the year a broad reconnaissance was carried out on the various types of soil derived from granite; this followed the work at Trelawney. Some

important findings resulted and it is hoped that a paper on the subject will be published shortly.

Another and very important type of reconnaissance also took place: This was in connection with a request from the head of the American Soil Survey for critical comment on their latest revision of a radically new system for classification of the soils of the world. Although the applicability of this system to Rhodesian conditions was investigated with great enthusiasm — and hope — the results have been disappointing.

The system of assessment of irrigable soils used in the Chemistry Branch, which was under revision, has been strengthened and given greater precision by the adoption of criteria from the American Bureau of Reclamation whose methods were not very dissimilar from our own. The Rhodesian system is thought to be sound and indeed requests for details of it have come from many parts of Africa.

Research and Investigatory Work

Although in investigatory work numbers of samples are not of cardinal importance it is nevertheless of interest to see that over a thousand samples were dealt with. Briefly there were 501 soils from field trials, 275 plant samples for nutrient and uptake, 197 samples for nitrification studies, 126 samples from the Great Dyke investigation and 24 for phosphate studies.

Soil fertility studies have continued as a major pre-occupation and trials carried out by the Department of Conservation and Extension, by individual farmers, the Government Research Stations, the Tobacco Research Board and Native Agriculture, have helped us to refine our criteria for grain crops, tobacco, potatoes, legumes, pasture and fodder crops, cotton and tea. It must again be emphasized, as it has been repeatedly in the past, that soil analysis and field experimentation are complementary and neither is complete without the other.

Nitrogen. For most crops in Rhodesia nitrogen is the main limiting factor in production, other than moisture in the lower rainfall areas. For this reason intensive work has continued throughout the year on method of assessing available soil nitrogen and predicting crop requirements.

Although the incubation technique is the most satisfactory general method of determining available soil nitrogen, there has recently been found to be a time lag in certain soils, particularly those from virgin or reverted lands, or those sampled early in the season. In these cases, where the time lag may be as long as the period of incubation, the usually determined nitrate nitrogen figure may be very misleading. It is hoped that next year a procedure involving the estimation of both ammonium and nitrate nitrogen will be adopted.

The predictable response to nitrogen of maize, now generally recognized, can be parallelled in the case of tobacco where responses average about 200 lb. leaf per acre per ten pounds of Nitrogen applied. In such cases, on suitable soil, all available data indicate that quality increases with yield over 1,000 lb. per acre and does not generally tend to decrease until yields exceed 1,500 lb.

Phosphate. The importance of phosphate in Rhodesian soils is second only to that of Nitrogen. On markedly deficient soils responses of 5 bags of maize, 500 lb. of tobacco or 100 bags per acre of potatoes may be obtained from the use of phosphate in the presence of adequate nitrogen applications. Considerable variations in phosphate status are however found amongst Rhodesian soils in different localities, and many soils have been encountered where it is adequate for general crop production.

The critical levels and rates of application for different crops have been further refined and it is clear that the "safety margin" allowed, particularly on the richer sands, has been too large, and that unnecessarily heavy dressings have been recommended in certain cases.

Potash. In common with most of tropical and sub-tropical Africa, the importance of potash in Rhodesia is still slight. Most soils have a fairly high potash status and responses in the field, when obtained, have been small. There again the "safety margin" has been too high and the use of maintenance applications may not have been economic.

Responses to potash have seldom been obtained on granite sands, while depressions in yield have been noted. On these soils of low base status it may be necessary to supply other bases, notably calcium and magnesium, in addition to potassium; the superphosphate-potash interaction observed by the Tobacco Research Board may possibly be at least partly due to a Ca-K interaction.

Calcium and Magnesium. Although responses to lime have not often been observed in Rhodesia there are indications that greater attention will have to be paid to the problem of its use in the future, particularly on sandy soils, and

as the use of sulphate of ammonia increases; trials on this and related problems are being laid down.

Little definite information has as yet been obtained as to deficiency levels of magnesium in sands.

Using versenate, a rapid laboratory procedure, suitable for routine use, has been developed for the determination of calcium and magnesium in both soil and plant extracts.

Minor Elements. It was not possible to do general work on minor element deficiency problems during the year, though a few miscellaneous cases were examined. An investigation into the infertility of certain soils on the Great Dyke was, however, started. Pot culture work, field trials and laboratory analyses were carried out.

This work has confirmed that nickel is present in toxic amounts in many serpentine derived soils but it has in addition established that in certain cases chromium may also be present in toxic amounts. When this occurs the toxicity is likely to be very severe and the soil extremely infertile. Nickel when present is readily taken up, with the development of a characteristic chlorosis. Chromium is not so readily taken up but interferes with germination and produces stunting. The symptoms seen in the field may also be influenced by deficiencies, as some of these soils are very low in boron. This work has great practical importance but also considerable academic interest, as reported cases of chromium toxicity are very rare and as some of the nickel contents found have been exceedingly high.

Attempts to correct these toxicities have not proved very successful, and certainly not economic, in severe cases, particularly when chromium is involved. It therefore becomes important to predict infertility before cropping is attempted, and some progress has been made in analytic procedures. Further work is urgently necessary, but unfortunately owing to deployment of staff, cannot be attempted in the coming year.

A great deal of exacting and painstaking work has been carried out on the nutrient uptake of maize, work which has been of great value in the study of soil fertility. Work was completed during the year on the nitrogen content of rainwater, and a paper submitted.

A good deal of the research work has now reached the stage where papers for scientific journals could usefully be written and it is hoped that time can be found for this essential part of the research programme.

The extremely important investigation of the benefits of green manuring, which involves thousands of analyses of crops and soils, is continuing and will not be completed for some years.

Pasture Research

The number of samples analysed this year, 1,443, showed an increase of some 240 over the previous year. By far the largest number (1,056) came from Grasslands. At Henderson a start was made with digestibility trials of the more common feed stuffs used in the Mazoe Valley, and it is anticipated that a good deal of time and effort will be involved in this work in the coming year. Of the 120 samples from Matopos, 43 were lowveld browse and grass species taken at monthly intervals during the dry season.

The total number of samples was made up as follows:—

Herbage and grass from Grasslands	1,002
Herbage and grass from Henderson	169
Herbage and grass from Matopos	114
Herbage and grass from Gwebi	18
Silage and feeds from Grasslands	13
Silage and feeds from Henderson	25
Silage and feeds from Matopos	6
Digestibility Trial, Henderson	55
Lysimeter Leachates from Grasslands	25
Maize Grain from Grasslands	13
Limestone samples from Grasslands	2
Grass stubble from Grasslands	1
TOTAL	1,443

ENTOMOLOGY

Staff. The professional staff of the branch remained at three throughout the year, though the appointment of an additional entomologist was authorized from the beginning of July. So far it has not been possible to fill this post. The need

for the branch to have the services of a fully-trained nematologist has become increasingly apparent during the year. Since the discovery a few years ago that the old "species" of eelworm, *Heterodera marioni*, in reality consisted of several closely related species, much work has been done in many parts of the world in determining to what extent these closely allied species differ in their host preferences. This work is of paramount importance in assessing what crop rotations are likely to succeed. It is now necessary when land is known to be eelworm infested to determine which species is involved before useful advice can be offered.

Research

Light-Traps. A number of research projects have been carried out at the laboratories at Salisbury. Many of these have been substantially helped by the establishment at the Salisbury Experiment Station of a light-trap. This is a copy of the successful design of Dr. C. B. Williams and is powered by a mercury vapour lamp. It was brought into operation at the beginning of January and, with few exceptions, has functioned every night since. The immediate object of its establishment was to see if army worm moths would be attracted and, if so, whether it seemed likely that it would be possible to forecast future outbreaks. Although there was no outbreak the information obtained gives hope that the forecasting of outbreaks will be a possibility in future. Army worm moths were caught in very small numbers almost every night over a period from the middle of January to the middle of March. Very few army worm larvae were found in the field and all found were of the passive phase. It is apparent, therefore, that considerably greater numbers of moths would be likely to be caught if an outbreak was imminent.

Cereal Borers. Works on the bionomics of the cereal borers has continued. It has been found that the so far undescribed Napier fodder borer is quite common at the Salisbury Experiment Station and it will doubtless prove to be so elsewhere. It has not yet been found to attack maize and other crops but its full life-cycle is not yet known. Like the maize stalk borer its larvae hibernate in the stems but, unlike that species, they can be made to pupate by incubating them in a humid atmosphere. So far it has not been found possible to distinguish the larvae of these two moths morphologically. The moths of these borers were attracted to the light-trap and it was thus possible to obtain information on their flight period.

An early maize stalk borer moth was captured on 28th September, 1955, and this, coupled with information obtained at the corresponding time last year, indicates that a small proportion of hibernating maize stalk borer larvae pupate early and give early moths. These habits do not seem dependent on environmental conditions. They may be genetically controlled and, if this proves to be so, the problem would be serious if the amount of maize and other cereals grown under irrigation increases appreciably.

Another cereal borer belonging to the genus *Sesamia* has been found in a number of localities. Attempts to elucidate its life-cycle have not so far been successful. Its economic importance is uncertain because again the larvae are very difficult to distinguish and it may often be confused with the common maize stalk borer.

Locusts. The green bush locust had been extremely troublesome at Selukwe in the winter of 1954, and a study of its bionomics was commenced. As had been found by other workers, it was very difficult to bring about egg laying in captivity but eventually two egg-pods were obtained in February. At present these have not hatched and this, coupled with the almost complete absence of the adults during the winter of 1955 lends strong support to the idea that this insect's life-cycle takes two years. Concurrently with this investigation the brown bush locust is being studied.

Cotton Pests. Further trials were carried out, in collaboration with the Gatooma Research Station, to determine the best way of applying insecticides for the control of cotton pests, particularly red bollworm. Endrin was used for the first time in this work and the results obtained so far are very promising. It was, however, only possible to use it at Salisbury, where the cotton crop, due probably to climatic conditions, was so poor as to render assessment of results difficult. Although sprays were generally found to be more effective than dusts practical considerations make it necessary to recommend a dust of 10 per cent. DDT and 3 per cent. BHC as a general purpose insecticide. The cost of applications of insecticides is high. An experiment was made to see if this cost could be reduced by reducing the number of applications. Applications in each treatment were started with first bud stage disregarding the degree of insect infestation. Eight treatments at weekly intervals gave significant increases in yield of seed cotton, whereas fewer applications were not as effective or profitable. To reduce the cost of insecticides and maintain effective control of insects, a different

approach is needed. It is proposed next season to start application of insecticide at flower stage and when signs of bollworm attack develop, to compare these. A feature, the importance of which has not yet been assessed, is the increase of mites following insecticide applications. Attempts to control these, using chloroparacide and chlorobenzilate, have not been successful but it is not yet known whether it is economically desirable to control them.

Insect Pests

A New Pest of Stored Grains. The most serious event of the entomological year was the discovery, for the first time in Southern Rhodesia, of the Khapra beetle, *Trogoderma granarium*. It was first found in February, in beans stored at Bulawayo, in such abundance as to suggest that the infestation must have existed, at least for several months. Subsequently it was found at the Grain Marketing Board's silo at Aspindale, Salisbury, being abundant in screenings stored outside and a few insects being found inside the actual silo building. Search was made in other places and it was found at Thornhill (Gwelo), Glendale and Mount Hampden. This pest of grains and other stored foodstuffs, though widespread through much of the world, has hitherto been of rather sporadic occurrence in Africa. It is probably the most difficult to control of the pests of stored products. A schedule of spraying, dusting and fumigating has been given to the Grain Marketing Board and it is hoped, by adhering to this, to minimize the spread of this pest. The insect seems already to be so thoroughly established and widespread as to render its extermination impracticable. Some of the places where it is now found have been carefully examined in recent years in connection with experiments on maize weevil control. It does therefore seem that the Khapra beetle is a recent arrival in Southern Rhodesia, a supposition which is supported by its recent discovery in Northern Rhodesia and the Union of South Africa. It may therefore be expected to spread if it finds conditions in its favour. No satisfactory method of control, under the conditions of storage and transport of grain prevailing in Southern Rhodesia, is known and it is very desirable that research into this problem should be undertaken. So far it has not been possible to do this.

Fruit. Fruit piercing moths were very troublesome in the Inyanga area at the end of 1954. They were reported also from other parts of the Colony. It is likely that the damage which they cause is quite often mistakenly attributed to fruit flies. No satisfactory method of controlling these pests is known, either here or in other countries where they occur. A considerable number of different species of moths is involved and they are not all closely related. The problem is made more difficult by the fact that the breeding places of the moths are not in the orchards where the damage is caused but may be anywhere in the neighbouring countryside. There is indeed evidence that some of the species concerned are migratory so that it is possible that the breeding grounds may in some cases be many miles from the site of attack. This problem is not likely to be satisfactorily solved without sustained research, which it has not so far been possible to begin. The problem bears some similarity to that of army worm in that there are years of severe attack separated by several years when the pest is not important. It does not follow, therefore, that in the coming season fruit piercing moths will be as numerous as they were last year.

Maize. Attacks by maize stalk borer were severe and widespread. Insecticidal dusting of the maize plants at the funnel stage had not always been effective in securing control. This may have been due to faulty or wrongly timed application.

A rutelid beetle *Adoretus cribosus* caused considerable damage to maize. The beetles hide by day in the soil and at night come out and feed on the leaves, the damage they cause having a characteristic appearance.

Locust Control. The International Red Locust Control Service has had a difficult year due to an upsurge in locust populations. The situation has been kept under control though it is anticipated that the next season will be a difficult one. Another locality where the solitary phase of the red locust persists was found in the Darwin District.

Miscellaneous

The weevils *Tanymecus destructor* and *Systates exaptus* caused severe damage to young maize and tobacco plants, the damage caused being sometimes so severe as to necessitate replanting. Surface beetles of the genus *Gonocephalum* were again troublesome in some tobacco lands but their attack was, in general, lighter than last year.

A leaf-eating ladybird, *Epilachna similis*, was several times reported from pastures. It was so numerous as to cause withering of the grass and, in addition to

this, the presence of the numerous larvae and pupae rendered the grass unpalatable to stock.

Several severe attacks on lawns by the larvae of moths of the genus *Spodoptera* were reported. Careful observations of these failed to disclose any constant features which would distinguish them from passive phase army worm larvae. Crickets were also extremely troublesome on lawns during the early dry season in the Salisbury District. It was found that aldrin gave satisfactory control.

A common scale insect, *Aulacaspis cinnamomi*, was found on Bay Laurel, *Laurus nobilis*. It has not previously been recorded on this host anywhere.

The citrus psylla was very much more frequently reported than usual. Its attacks disfigure the leaves and must to some extent retard development, but the actual damage caused is probably so little as rarely to justify the expense of control measures.

A cerambycid beetle, *Hecyrida terrea*, was bred from an avocado branch inside which the larvae had been feeding.

Advisory

The number of inquiries recorded at the branch continued the upward trend which has been apparent in the last few years and reached 727, an increase of over a hundred on last year's figure of 623 (exclusive of army worm inquiries) which itself was a substantial increase on the 1953 total of 531.

Very few advisory visits were made, the total being only 35, due to the small staff being fully committed at the laboratories. Seven of these visits were made during a tour of the Inyanga area, this being the first time for several years that this area had been visited by an entomologist.

Publications. A comprehensive bulletin on army worm and one on parathion insecticide were published in the *Rhodesia Agricultural Journal*. Illustrated warning articles on army worm were published in the *Rhodesian Farmer*; also one on citrus psylla.

Plant Regulatory Service. A regulation prohibiting the import of citrus from the Transvaal, O.F.S. and Natal was published. This was made necessary by the spread of citrus black spot and citrus red mite in those provinces.

There was again an increase in the amount of plant material entering the Colony, the total at the various points of entry being 1,119,400 packages in 35,319 consignments. To help deal with this volume of traffic the appointment of an additional Plant Inspector has been authorized and it is hoped that he will shortly begin his duties.

The total of Special Permits for the import of individual consignments of plants issued was 870. Annual Permits were issued to 67 nurserymen in the Union of South Africa for the import of their stock into Southern Rhodesia without further formality.

Forty-nine nurseries were registered in Southern Rhodesia. It was not found necessary to place quarantine restrictions on any of them, very few pests being found in the course of inspections.

Tobacco. Tobacco Removal Licences issued for 1955 increased slightly to 3,339. For the first time for many years the number of inspections made, 3,676, exceeded this total, indicating that every tobacco premises was inspected at least once during the year. This was made possible by the appointment of the additional inspectors authorized towards the end of last year. There are now six inspectors almost all of whom have now completed at least one year's work.

Six successful prosecutions were made in terms of the Tobacco Pest Prevention Regulations, five for failure to destroy unwanted plants by the 1st July, and one for failure to destroy unwanted seedbed plants. One other prosecution failed on technical grounds.

In the course of inspections tobacco beetle was found six times and appropriate action taken to destroy it. It was also intercepted in bales of tobacco consigned from Northern Rhodesia to the Tobacco Auction Floors. These bales were destroyed thus forestalling what could have been a serious event. Health certificates issued in respect of plants for export totalled 138.

TSETSE FLY OPERATIONS

Staff. There has been little improvement in the staff position. Although three additional posts for tsetse entomologists were approved at the end of 1954, three posts still remain vacant. Great difficulty has been experienced in recruiting

suitable field staff. The administration has been seriously hampered by changes of clerical officers.

Report on Tsetse Situation. Partly as a result of public and Press criticism of the Government's policy of game destruction as an anti-tsetse measure, the Minister instructed the Trypanosomiasis Committee to produce a report on the tsetse and trypanosomiasis situation in Southern Rhodesia. The report, the combined efforts of several officers, was submitted to the Minister in November and published in December under the title "A Review of Tsetse and Trypanosomiasis in Southern Rhodesia, 1954".

Commission of Inquiry. Following the publication of the "Review", Government announced that a Commission of Inquiry would be set up to inquire into all matters relating to human and animal trypanosomiasis in Southern Rhodesia, and to recommend any action which, in the opinion of the Commissioners, might seem desirable in the public interest. The Commission under the Chairmanship of Sir Eric Thomas, completed a public inquiry in July and the report is expected before the end of the year.

Trypanosomiasis Committee. There were twelve ordinary and four special meetings of the Trypanosomiasis Committee. The Committee has been strengthened by the inclusion of the Chief Commissioner of the Forestry Commission, and the Territorial Game Officer.

Investigations

During 1951 and 1952 an entomologist spent more than a year at Kariangwe in the Sebungwe district, carrying out investigations on the bionomics of tsetse. Part of the work entailed taking samples of the blood meals of tsetse in order to determine the hosts from which the flies had fed. The samples were submitted to the East African Tsetse Organization for identification. The results are interesting. Out of 200 blood meals collected from recently fed flies, 6 per cent. had been derived from elephant, 6 per cent. from rhinocerous, 32.5 per cent. from bovids, and 40 per cent. from warthog and bushpig, 2 per cent. from man, 0.5 per cent. from monkey, 2.5 per cent from birds, 1.5 per cent from unidentified mammals and 8.5 per cent. were unidentified. The comment accompanying these results was that more data are required before reliable conclusions could be drawn. It is evident, however, that the technique may be employed to determine the favoured hosts of tsetse during different times of the year. Such knowledge might have a profound effect on the conduct of game control operations.

The species *G. morsitans* has recently been shown to exist in two forms, one long-winged and the other short-winged. Both forms are known to occur in Northern Rhodesia, but specimens from the Urungwe fly belt were identified as belonging to the short-winged form *G. morsitans orientalis* of Vanderplank. This is the only form known to exist in Southern Rhodesia. Further collections will be made.

Kariba Gorge Project. Human sleeping sickness is endemic at a low level in the area of operations of the Kariba Gorge Project. Anxiety was felt by the Hydro-Electric Board and the consulting engineers that the disease might prove a hazard to personnel engaged on the site, and the advice of the Trypanosomiasis Committee was sought.

A tsetse and ecological survey carried out by this Branch determined the distribution of tsetse in the area and located the likely breeding sites. Recommendations were made for the control of tsetse and protection of the personnel.

Following discussions with the Board and the consulting engineers, it was agreed that the Board would assume responsibility for the control of tsetse in the area of operations. It is intended that a clearing some five square miles in extent, will be made in the bush surrounding the construction area, and traffic to and from the area will be cleansed of fly by treatment in simple temporary cleansing chambers. Both "Swing-fog" and "Microsol" fog applicators will be used to apply insecticide to the traffic. The use of aircraft to apply insecticide and the use of bush clearing were considered, but were rejected at this stage, the first in the light of previous experience of operations with aircraft during the rains, and the second because of the great expense involved.

Experiments are proceeding in the area, along the Kessesse River to determine the value of the Swing-fog machine as a means of controlling tsetse.

Experiments with Aboricides. Investigations are being carried out by the staff of the Forestry Commission, financed from the votes of this Branch, to determine the value of various defoliants and arboricides, applied by various means, in killing or defoliating woodland, and thus rendering it unsuitable for tsetse.

G. Pallidipes Survey. Shortage of staff has prevented a survey being made. It is particularly important to ascribe the eastern limit of this species in the Zambesi Valley, and its distribution in the Wankie district.

An average of 800 hunters were employed for game elimination. These destroyed 41,576 head of game for an expenditure of 107,401 rounds of ammunition, giving an average of 2.5 rounds per head.

Small game represented 41 per cent. of the total. It is almost certain that most of these small buck are trapped, or killed by other means by residents in the native areas within our operational areas, where they are permitted to do so, and that the tails of these animals are acquired by the official hunters. Consequently, it was decided, at the end of the year, not to accept tails of duiker, steenbuck, Charpe's steenbuck, Klipspringer, oribi and Livingstone's suni. It is not anticipated that this decision will have much effect on the progress of tsetse fly operations as it is expected these animals will still be destroyed in any case.

It is interesting that a Livingstone's suni has been identified from the Mtoko district. This is a coastal species that has only been recorded elsewhere in this country from the Lower Sabi Valley.

(a) *Urungwe District*

Urungwe Native Reserve and Dekete Section. Only one case of animal trypanosomiasis occurred on the Karoi block of farms. The area has been constantly under close supervision of the Veterinary Department. The outbreak can be considered to be under complete control.

The tsetse position between the central and eastern fences has greatly improved. Only one fly was taken at Magunge cleansing chamber, and none at Magunge gate or Nyamtora (=Badze) stile. There has been an increase at Karambanzungu gate in the central fence, corresponding with an increase in the north western area west of the reserve. Elsewhere both at the central and western fences, there has been a marked decline in fly taken from traffic. The decrease in fly taken at Zemaiwe gate can be attributed to the effect of the aerial spraying carried out in that area. Game destruction between the western fence and the Sanyati River has been re-organized and intensified, and as a result of the improved situation, hunters have been transferred from the eastern to the western half of the reserve.

It must be stressed, however, that it will not be safe to reintroduce cattle into the Urungwe Native Reserve until the whole area to the Sanyati River is declared free of fly.

Gota Gota Section. This area, previously controlled by rangers from Vuti and Magunge, is now under the control of one ranger stationed near Chipitani Hills. There are heavy concentrations of fly in the area, and the old approach road to Kariba Gorge traverses it.

(b) *Mrewa: Mtoko: Inyanga North*

Delays in obtaining supplies of wire delayed the building of a game fence between the Ruenya and Mazoe Rivers. Work was begun in July, 1955, and has proceeded rapidly. It is anticipated that the entire 45 miles of fence will be completed in October, 1955.

Except on the Mudsi and Nyamsanzara Rivers, near the Portuguese border, the incidence of tsetse remains extremely low. Only two cases of trypanosomiasis at one dipping centre were recorded.

The numbers of cattle in the Chikwizo Native Reserve fell from about 300 to 250. Most of the deaths were due to trypanosomiasis. If the cattle can be prevented from grazing and watering on the Nyamsanzara, an improvement should occur.

There has been a serious outbreak of trypanosomiasis in the Fungwe reserve. Over three hundred clinical cases, and 83 deaths have been recorded from some 4,500 head of cattle. A rapid inspection of the area was carried out by Mr. H. E. Hornby, a member of the Trypanosomiasis Committee, and a more detailed tsetse and ecological survey was in progress at the end of the year. No tsetse have been recorded from the area. A cattle fence is to be constructed along the eastern boundary of the Mtoko Reserve and across the Fungwe Reserve to isolate the northern infected portion of the reserve. Cattle north of the fence will be removed.

(c) *Sebungwe District*

A third main camp, with a European in charge, has been established on the Mzola River to intensify operations in that area. There has been a serious increase in recorded tsetse in the eastern zone, south of Malundu Camp, and captures along the Mzola River have increased. On fly was taken south of the Kana River.

Two further traffic control points have been established to deal with increased traffic in the area. One is at Borehole 60 to control traffic on the road to the Kana River and the other is on the road running west to Lubimbi.

Owing to delays, only 12 miles of the fence running along the centre road have been erected, and cattle still graze in contact with fly on the Mzola River.

The general situation is disquieting.

(d) *Lomagundi North*

The general situation remains satisfactory. Following the report of the capture of a tsetse on Farm 43 a tsetse survey of the area is being carried out. An inspection of cattle in the area has not revealed any case of trypanosomiasis.

(e) *Lomagundi S.W. and Eastern Sebungwe*

One *G. pallidipes* was taken in October, 1954, on the Yantse River near the confluence of the Msukwe and Sanyati Rivers. The general situation remains static. No tsetse have been recovered from the triangle between the Umfuli and Umniati Rivers, and hunters have been removed from this area and redistributed west and north of the Umniati River.

(f) *Darwin District*

For the third successive year, no tsetse have been seen in the area of operations, and cattle in the Chiswiti and Mzarabani reserves continue to increase.

(g) *Eastern Border (Chipinga District)*

Forty-four tsetse were caught along the Border Clearing all in Portuguese Territory. They comprised 26 *G. pallidipes*, 16 *G. brevipalpis* and 2 *G. morsitans*. Of these, 27 were caught in traps and the remainder from man or on paths.

There were 57 recorded cases of animal trypanosomiasis involving 15 European owned farms, and 48 cases amongst Native owned stock.

The whole of the border clearing was maintained in good order by cutting regrowth and burning, but no new clearing was undertaken.

(h) *Sabi Valley East (Chipinga District)*

There has been a serious extension of the area infected with trypanosomiasis involving the Musikwanu Native Reserve and the Native Purchase Area. Eight dipping tanks were involved and 121 positive cases diagnosed. All cattle in the area were inoculated with dimidium bromide with distinctly good effect.

An entomologist is undertaking a tsetse and ecological survey of the area. There is evidence of a marked increase in the density of *G. morsitans* in Portuguese Territory from the Ndanga River north of Makoho to the Sabi-Lundi junction. *G. pallidipes* is firmly established on the Rupembi River, and specimens have been taken in Southern Rhodesia over a wide area from the Honde River south to the Sabi River. Efforts are being made to establish check points to control traffic on roads running through the area.

(i) *Sabi Valley West (Ndanga District)*

A permanent camp has been established on the west bank of the Sabi River, near the P. & O. Mine, and a European ranger stationed in the area. Surveys indicate that *G. morsitans* may be permanently established in the Chuhanja plateau area south of the Ndanga East Reserve. One *G. pallidipes* was taken on a tributary of the Lundi River. The ranching area west of the Sabi River is faced with a grave potential danger from the incursion of tsetse and, with it, trypanosomiasis.

Great difficulty is being experienced in recruiting labour in the area.

A serious outbreak of trypanosomiasis occurred amongst cattle in the Ndanga East Reserve involving some 5,000 head. All the cattle were block inoculated with good results. One case occurred in the Sangwe Reserve and four on the Humani Ranch in the Bikita district.

The Application of Aerosol from Aircraft. The application of aerosol by means of aircraft, referred to in the previous annual report, continued until November 30th, 1954. Meteorological conditions deteriorated further, and flying operations were abandoned on numerous occasions.

The original plan was to cover all the river systems between the Kanyati and Badze Rivers. In practice, progressively smaller areas were treated until, finally, the only area which had received the full number of treatments was the Mzukwe-Badze basin. This area had received seven applications between December 1953, and March 1954, and five between July and November 1954. Fly-round figures indicate a marked and persistent reduction in the tsetse population in the Msukwe/Badze area, but elsewhere in the treated area the fly populations show little change from normal.

Recruitment of Special African Constables and Fly Boys. The Commissioner of Police has now ruled that he is not empowered by the Police Act to attest Special African Constables for work in connection with tsetse control.

Those who have been attested may have to be discharged, and possibly re-employed under another designation. These trained Africans have proved invaluable in the past as Gate Guards and Police Boys. Well educated Africans trained as fly boys have proved themselves indispensable in carrying out fly surveys under the supervision of entomologists. More are required.

BOTANY AND PLANT PATHOLOGY

The activities of all three sections of the Branch continued to expand both as regards the volume of routine inquiries and the range of research and investigational work. Even greater progress might be achieved but for the severe handicap presented by the unsatisfactory nature of the buildings occupied by the Botany and Plant Pathology sections. Lack of space in the corrugated iron building, graced by the name of Herbarium, has already reached a critical stage, and unless more accommodation can be provided very soon the congestion will be such as to seriously interfere with the day to day work. Inadequate laboratory facilities are also hampering progress in the Plant Pathology section.

Many important projects undertaken by the Branch require close contact and collaboration with our colleagues in other divisions of the Ministry of Agriculture. In this connection special mention must be made of the valuable assistance provided by the Department of Conservation and Extension in disease surveys in maize, potato and legume crops. Maize disease investigations were continued with the helpful co-operation of the Salisbury, Gatooma and Sabi Experiment Stations. Potato disease problems were studied at the Henderson and Salisbury Stations whilst a great deal of attention was paid to the development of seed potato production in conjunction with the Chief Agriculturist.

Officers from all sections travelled extensively in the course of their various duties. Numerous visits were made in connection with disease problems of vegetables, field crops and fruit trees; special attention again being directed to such problems in the Eastern Districts where our inspection services with the seed potato production scheme permitted several extended tours. Further botanical collecting expeditions were made in several parts of the Federation. The Seed Analyst inspected many vegetable, legume and grass crops grown for the purpose of seed production.

Several Farmers' Associations were addressed by members of the staff who also assisted in judging at four agricultural shows. A course of six plant pathology lectures was delivered to students at the Gwebi College of Agriculture, where the Chief Botanist and Plant Pathologist contributed towards a successful field demonstration of modern spraying and dusting machinery.

Seven papers were published in the *"Rhodesia Agricultural Journal"* and several notes and articles contributed to the *"Rhodesian Farmer"*. Brief notes on local plant diseases were prepared for the *"Commonwealth Phytopathological News"* a publication issued quarterly by the Commonwealth Mycological Institute.

Botany

Herbarium. Accessions totalled 7,196 which represents an increase of nearly 70 per cent. over any previous year. Of these, 3,810 were named for other Government Departments and included substantial collections from Northern Rhodesia and Nyasaland. More than 1,500 specimens were collected by the Excell, Mendoça and Wild expedition which made a comprehensive tour of the Federation and Portuguese East Africa during the early part of 1955.

In addition to the dispatch of several thousand duplicates to Kew and elsewhere for routine naming, large numbers of specimens were also sent abroad for critical study by specialists. Such activities have been greatly stimulated by developments in connection with the Flora Zambesiaca project. These include the appointment of another systematic botanist and the recent visit of Mr. A. W. Exell of the British Museum and Dr. F. A. Mendonca, the eminent Portuguese botanist, to the Federation. Although certain financial aspects are still under consideration other arrangements regarding the organization and administration of this important scheme are well advanced.

We are perhaps fortunate that world-wide interest in the African flora has coincided with the initiation of the Flora Zambesiaca since this makes it possible for us to take advantage of current monographic and special studies in various difficult groups. Work has already commenced on the families to be dealt with in the first volume of the new Flora.

The remaining three parts of the *"Revised List of Southern Rhodesia Grasses"* were published during the period under review. The glossary and index to this useful work has been completed and now awaits publication.

Economic Botany. Eight cases of suspected plant poisoning in animals and humans were investigated on behalf of the Police, Veterinary Department and the Government Analyst. Plants used in native herbal remedies were identified for Dr. M. Gelfand who is making a special study of this subject. Several inquiries were received concerning the supply and usage of *Rauvolfia caffra* for pharmacological purposes. Assistance and advice was also provided in the case of other plants possesing medicinal uses. Detailed information regarding the distribution and native names of *Cannabis sativa* (Dagga) was supplied to the U.N.O. Commission on Narcotic Drugs.

Nearly 1,300 grasses were named and advice given on the practical value of many special collections sent in by farmers, Extension officers and other Departments. Similar assistance was provided regarding the many specimens of indigenous and exotic legumes sent in for identification and report.

Enquiries on the identification and control of weeds are becoming so numerous that they serve to emphasize the increasing importance of weed problems in the more intensive systems of agriculture now being adopted by many farmers. Developments in chemical control methods are so numerous that it is difficult to keep abreast of the literature let alone their practical application. In fact, the whole subject is becoming so specialized that a strong case undoubtedly exists for appointing a full-time worker on weed problems. To some extent this difficulty has been met by the publication of two useful works dealing with local weeds. The larger and more comprehensive of these has just appeared under the title *"Common Rhodesian Weeds"*. It contains full-page line drawings of 100 common weeds with descriptive accounts of each together with recommendations for their control. The second publication describes locally occurring witchweeds in some detail and is also fully illustrated.

Measures to control the water hyacinth infestation in Lake McIlwaine and the Makabusi River, which are under the guidance of this Branch, have met with considerable success and the situation is better than for several years past. A 2, 4-D amine salt applied at 2 lb. acid equivalent per acre has been adopted as a standard treatment. Preliminary trials were conducted with the same hormone spray from aircraft but gave erratic results because of the difficult and dangerous operating conditions. Two further outbreaks of water hyacinth were discovered in the course of the year. Both are fairly localized, the more potentially dangerous outbreak occurring in the Tsungwesi and Odzi I.C.A. areas where at least four separate infestations were found. The worst of these is in the Tsungwesi River itself and originated in a small farm dam which had overflowed into a small tributary of the main river. As the Tsungwesi flows into the Sabi the danger to development schemes based on the latter river cannot be over-estimated. The second outbreak is more localized in a minor stream in the Beatrice district. Immediate action has been taken to deal with both infestations coupled with intensive propaganda through the agencies of the Natural Resources Board, the radio, Press and other Departments.

National Botanic Gardens. Once again it is regretted that no development has been possible with this project apart from routine care and maintenance. Despite all precautions, several grass fires broke out in the Gardens during the dry winter months, fortunately without serious damage to the vegetation.

Plant Pathology

Advisory. The 1954/55 rainy season was unusually prolonged and, judging from the large number of new records obtained, appears to have been exceptionally favourable for the development of many plant diseases. Notable examples include ergot fungi on grasses and small grain crops, downy mildews on curcubits, garden pea and maize, and the spot anthracnose or scab diseases of French bean, cowpea, velvet bean and several weed hosts.

A record total of 956 specimens was received which contained 61 new host and disease records amongst which the following may be specially mentioned:—

Leaf spot and grain rot of maize due to *Diplodia macrospora* Earle; downy mildew of maize due to *Sclerospora sorghi* (Kulk). Weston & Uppal; glume blotch of wheat due to *Septoria nodosum* Berk; rust of Italian rye grass due to *Puccinia coronata* Kleb.; leaf spot and downy mildew of garden peas, due to *Cladosporium cladosporioides* Fres. *f. sp. pisicola* (Snyder) de Vries and *Perenospora viciae* (Berk.) Casp. respectively; downy mildew of both cucumber and sweet melon due to *Pseudoperenospora cubensis* (Berk. & Curt.) Rostovz; anthracnose of red clover due to *Colletotrichum trifolii* Bain & Essary.

Tobacco. Enquiries totalled 174 compared with 138 the previous year. The outstanding feature of the season was the rapid development of anthracnose *(Colletotrichum tabacum)* of which only one case had previously been recorded. Seedbeds on at least ten farms in the original outbreak area at Nyabira were attacked and the disease also spread to another six tobacco growing districts.

Where used, Zineb sprays gave satisfactory control. Wildfire and angular spot were prevalent, the former attacking both seedlings and plants in the field, whereas the latter disease was mainly recorded from maturing plants. The incidence and severity of angular spot was heavier than for many years. A leaf spotting ascribed to nitrogen-phosphate unbalance was frequently noted affecting seedlings. Rosette virus was again common in some districts, the symptons being the mild atypical form previously reported. Frog-eye and *Alternaria* leaf spots were common but no reports of serious losses due to these diseases were received. Very few cases of barn rot and white mould were reported.

Potato. For the third successive season a severe epiphytotic of late blight developed in the summer crop and was particularly devastating in the main producing region centred around Salisbury. Warning notices were issued in the Press and over the radio a week before the outbreak developed during the latter part of December. The onset of the disease was delayed for several weeks in the Eastern Districts where weather conditions were drier during December and early January. Late blight was recorded for the first time in the Bulawayo area. The late and prolonged rainfall during April and May was followed by a second outbreak of late blight in the early irrigated crop around Salisbury.

Blackleg *(Erwinia atroseptica)* occurred in several irrigated crops grown from imported seed. In a low veld planting more than 20 per cent. of the crop was attacked and many tubers rotted in the ground.

Powdery scab *(Spongospora subterranea)* was recorded in two irrigated crops of Pentland Ace potatoes grown from imported seed.

Seed Potato Scheme. Most of the field inspections required for this scheme in the Eastern Districts were conducted by the staff of the Branch. This was considered necessary to determine the incidence and distribution of bacterial wilt *(Pseudomonas solanacearum).* Largely because of this disease only four out of the twelve crops included in the scheme were approved. Despite the high proportion of rejections, growers are still keenly interested in the scheme and it will be continued for another season in its present form.

Maize. Weather conditions favoured the development of Helminthosporium leaf blight which is undoubtedly the major disease hazard faced by the industry. The disease appeared at an early stage in the growth of crops in several districts and caused considerable losses.

Tropical rust *(Puccinia polysora)* was discovered nearly a month earlier than in any previous season attacking single hybrids in a commercial planting. Subsequent surveys revealed a widespread infection throughout the Mazoe Valley and the Gatooma-Hartley maize areas. The incidence of rust tended to decrease with higher altitudes. Apart from the first outbreak in the Shamva district the disease appeared too late to cause appreciable damage. However, the wider distribution now observed lends emphasis to the importance of developing rust resistant maize varieties suited to local conditions.

Diploda macrospora. was recorded for the first time causing both a leaf spot and ear rot of maize. The leaf spotting phase does not appear to be of much consequence but as the new disease is just as destructive to maize grain as the better known and widely occurring *Diplodia zeae* its behaviour will have to be carefully watched in future.

Downy mildew of maize caused by *Sclerospora sorghi* was also observed for the first time on experimental crops in the Sabi Valley. Considerable varietal differences in susceptibility were noted.

Fusarium graminearum, which is commonly responsible for cob-rotting, was found to be associated with premature wilting and lodging of maize on waterlogged soil.

Streak virus was prevalent in the Eastern Districts low veld. Some maize lines at the Sabi Station were unaffected and deserve further study as possible sources of resistance towards this disease.

Forage and Green Manure Crops. Fewer reports were received of stem-break in sunnhemp despite suitable conditions for its development. Although many farmers have adopted our recommendations for the use of a T.M.T.D. seed dressing, insufficient evidence is available to determine whether this one procedure has, in itself, been effective in reducing the general incidence of the disease. The stem and vine rot of velvet bean due to *Phytophthora dreschleri* spread to other farms in the vicinity of the original outbreak at Mazoe. One case was also reported from Norton.

Colletotrichum trifolii caused severe damage to red clover in an irrigated pasture; white clover in the same mixture was unaffected. Leaf spot and rust of lucerne were reported frequently.

An unprecendented outbreak of ergot occurred on veld grasses in many parts of the country and several new host records were listed.

Native grown munga crops were also extensively attacked by ergot. Preliminary chemical analyses both in Salisbury and overseas revealed an exceptionally high ergotoxine content in ergot infected grain. Further samples have been supplied for pharmacological tests.

Vegetables. Serious outbreaks of scab due to *Elsinoe* (?) *phaseoli* and anthracnose (*Colletotrichum lindemuthianum*) were responsible for losses of between 10 and 20 per cent. in French bean crops at Umtali. Copper fungicides proved ineffective against these diseases. Bacterial wilt was commonly reported on tomato plantings in the Eastern Districts, whilst leaf mould (*Cladosporium fulvum*) was again recorded, after a lapse of three years, on low veld crops of the San Marzano canning variety. Leaf mould of Garden pea, caused by *Cladosporium cladosporioides* f. sp. *pisicola*, was discovered for the first time. Black rot (*Pseudomonas campestris*) was prevalent and destructive amongst cabbages and cauliflowers grown under irrigation.

Fruit. Mildew was widely reported on deciduous fruit trees especially apple and peach. The first record of this disease of nectarine was obtained during the year under review. Bitter rot (*Glomerella cingulata*) was again responsible for serious losses in apples in many Eastern Districts orchards.

More reports of concentric ring blotch of citrus were received than usual. Whether this can be ascribed to increased plantings or to a greater incidence of this strange disorder is uncertain. Citrus black spot (*Phoma citricarpa*) was confirmed on South African oranges intercepted by the Plant Inspector at Bulawayo.

Flowers. A species of *Phomopsis* was determined to be responsible for a dieback of Azaleas. During routine inspections of dahlias, Kromnek (tomato spotted wilt) virus was detected in five imported varieties, all of which were supplied by the same concern in Holland. Infected plants were destroyed and action taken under the Plant Protection Act to prevent further introductions of diseased tubers from this source.

Research

Maize. Several hundred maize lines were tested against *Helminthosporium* leaf blight and tropical rust. No appreciable resistance to *Helminthosporium turcicum* was detected in material obtained from Kenya, West Africa and Nyasaland. On the other hand some of the Natal inbreds compared favourably with the most resistant local types. In the case of tropical rust, all the local material tested was completely susceptible but promising resistance was shown by a number of crosses between Nyasaland inbreds and resistant lines and resistant lines from Kenya. The variety Mexican 16 supplied by E.A.A.F.R.O. Kenya also exhibited good resistance. Zineb sprays gave effective control of both leaf blight and tropical rust in trials designed to establish the yield losses caused by these two foliage diseases. In the case of *Helminthosporium* leaf blight plots protected by the fungicide yielded 29 per cent. and 31 per cent. more in cob and grain weights than the unprotected plots. Similar trials with tropical rust were complicated by the development of streak virus but, even so, the protected plants showed a 25 per cent. increase in yield.

Sunnhemp. Field and laboratory studies on the stem-break disease due to *Colletotrichum curvatum* were continued. The importance of seed borne trash as the chief source of infection was confirmed. T.M.T.D. seed dressings at 8 ounces per 200 lb. seed gave satisfactory control of the disease in field trials. Infection and lodging increased with higher rates of sowing. In one fertilizer experiment sunnhemp responded strikingly to phosphate although potash was ineffective. The onset and development of stem-break was retarded in plots receiving high applications of phosphate. *C. curvatum* was able to survive in diseased crop residues until the following season.

Velvet Bean. No alternative hosts have yet been discovered of the fungus *Phytophthora dreschleri* which is responsible for the serious root and vine rot of velvet bean. Present indications are that the disease can persist in the soil for at least two years. All 15 varieties of velvet bean tested on infected land succumbed to the disease.

Potato. In further trials at the Salisbury Experiment Station with late blight resistant varieties both "Pentland Ace" and "Kennebec" again showed promise although race (3, 4) of *Phytophthora infestans* appeared in several commercial plantings of the former whilst race (1, 4) was encountered on "Kennebec". Four varieties obtained from Holland gave excellent yields under severe blight conditions which suggests that the field resistance possessed by these varieties may be sufficient to allow the production of satisfactory commercial crops during the summer months.

An investigation into the transmission of potato blackleg (*Erwinia atroseptica*) was commenced in collaboration with the Plant Pathology Station, Corstorphine, Scotland. Preliminary results tend to confirm the view that imported seed tubers carry substantial amounts of infection but further work is necessary to determine the persistence of the blackleg organism in local soils.

General. Investigations were also commenced or continued on many other plant disease problems including bacterial wilt of Solanaceous crops such as potato, tobacco and tomato; scab disease of legumes, especially French bean; *Cercospora* leaf spots of tobacco and groundnut; ergot infection of indigenous pasture grasses and various small grain crops. The scope of such investigations has, inevitably, been restricted by other demands on the professional staff and by the limitations of space and equipment.

Seed Testing

This section has been closely concerned with the expanding activities of the Rhodesia Pasture Seed Growers' Association and with the increasing interest shown by farmers in the commercial possibilities of flower and vegetable seed production. Demands on the staff for advice and inspection services in connection with these developments have been very heavy and if the present trend continues it will be difficult to satisfy all requests for assistance unless more staff is recruited. Improved laboratory accommodation and new equipment permitted the more expeditious testing of samples and facilitated the prompt issue of reports.

Laboratory. 1,133 samples were submitted for testing an increase of 70 per cent. on last year's figures. 13.5 per cent. of all samples failed to reach the required minimum standards. 2,227 germination tests were made. In addition, numerous samples were sent in for seed identification, treatment for hard seed, dodder tests and disease examination.

Vegetables again provided the largest proportion of the samples received, closely followed by maize, grasses and legumes.

Maize seed contained more infection by *Diplodia zeae* and *Fusarium graminearum* than in previous years despite which the germination capacity was maintained at a satisfactory level. The increased incidence of these important cob-rotting pathogens is ascribed to the heavy and prolonged rainfall during the season under review.

It is pleasing to report a marked improvement in the quality of legume seeds, particularly in sunnhemp and velvet bean. Hard seed commonly occurs in these two legumes, but as recent investigations indicated this condition to be of a temporary nature only, it has been considered safe to add three-quarters of the hard seed content to the germination percentage in reporting on such samples.

31 grass seed crops were tested on behalf of the Rhodesia Pasture Seed Growers' Association. Whilst most of these samples were of excellent quality an undesirably high weed seed content occurred in several lots.

Legislation. 237 samples of vegetable seeds were drawn from agents and suppliers during routine inspections in the main towns. No less than 89 of these were rejected as being below standard whilst a further 77 samples were found to be incorrectly marked. It is abundantly clear from the numerous contraventions encountered that far more vigorous action will have to be taken if the Seed Regulations are to be properly enforced. Periodic visits were made to the four approved seed testing laboratories now established in Salisbury.

Research. Field trials were conducted with various crop and vegetable seeds treated with a range of fungicide dressings. Mergamma, a combined insecticide-fungicide preparation, Agrosan and Harvesan were all effective for maize. The T.M.T.D. preparation Fernasan, and another non-mercurial dressing marketed as Tetroc proved satisfactory for use with tomato, carrot, onion, cabbage, lettuce, pea and bean seed. Lettuce seed was found to be very sensitive towards all preparations containing mercury. Agrosan and Tetroc gave good results with sorghums, but care must be taken to avoid over-dressing such small grains when using mercurial preparations.

Investigations were continued regarding the treatment of tobacco seed with silver nitrate solution. It was confirmed that washing the seed with water after treatment is unnecessary. The addition of a wetting agent to the silver nitrate solution improved its efficiency. Tobacco seed should only be treated in the year of sowing as the germination capacity of treated seed decreases in storage.

The results of viability tests on lettuce seed were published. Once lettuce seed shows signs of declining vigour its germination capacity tends to fall off rapidly, losses of as much as 70 per cent. being observed within six months.

Assessments of the behaviour of maize inbreds, hybrids, and open pollinated types towards the major cob-rotting diseases were again made. An examination of the results of this long-term investigation reveals a similar pattern as regards the infection index. This suggests that one pathogen might be used instead of four thus simplifying the field work involved. The problem is being studied further.

Miscellaneous

The Chief Botanist and Plant Pathologist continued to co-ordinate the distribution of information on tropical maize rust and *Helminthosporium* leaf blight throughout the Federation and South Africa and to other research centres in Africa working on these problems.

In addition to representing the Branch on various Departmental and other committees he was also appointed Liaison Officer for the Federation in connection with the Commonwealth Agricultural Bureaux. The duties involved by this appointment were unusually heavy on account of the C.A.B. Review Conference which took place in London during July, 1955. He continued as a member of the Federal Scientific Consultative Committee and attended, by invitation, the 1955 meeting of the Scientific Council for Africa which took place at Luanda, Angola, in September.

GATOOMA RESEARCH STATION

Introduction

Following on Federal Government decision, the Gatooma Research Station was transferred from the Cotton Research and Industry Board (now the Cotton Industries Board) to the Federal Ministry of Agriculture on the 1st February, 1955. The Station had functioned as part of the Board's organization since 1942; and previous to that year it had been run jointly by Government and the Empire Cotton Growing orporation since 1925.

The main function of the Station continues to be concerned with cotton experimental work, which embraces investigations and trials on plant breeding, plant pathology, insect pests control, and agronomy. Complementary to the work which is being conducted at Gatooma, cotton variety trials, which embody also insecticidal treatment, are grown at nine centres covering a range of weather conditions and soils, scattered throughout the country.

Furthermore, investigations are being made into cultural and fertilizer treatment of the crop grown in the sandveld soils at M'Sengesi and Mondoro. Also, advice and assistance is given in the running of date-of-planting, insecticide and plant breeding trials at the Sabi Valley Experiment Station, where irrigated cotton is grown under lowveld conditions.

Additional to cotton investigations the scope of the Station's work has been broadened, in so far as the programme of cotton experiments and present numbers of staff will allow, to include the following in the 1955-56 season: A maize hybrid trial, a sorghum trial, and wheat and legume varieties in observation plots, for the different Plant Breeders who are working with these crops at other Stations; a sunnhemp seed treatment trial for the Branch of Botany, a maize stubble mulch experiment in which the Department of Conservation and Extension, and the Branches of Chemistry, Botany and Entomology are interested; and certain preliminary observations, in co-operation with the Chief Conservation Engineer, to determine the reasons and possible remedies for waterlogging, in much of the good farm lands of the area, in seasons of high rainfall.

The Conservation and Extension Department maintain useful grass and forest nurseries at the Station and there is close co-operation in agricultural matters between officers of this Department, resident in Gatooma, and the Station's staff.

A programme covering a wide range of cotton and other work for the 1955-56 season was submitted to and approved by the Ministry's Research Advisory Committee at a meeting at the Station on the 30th September. The vice-president of the Rhodesia Cotton Growers' Association attended the meeting.

At the suggestion of the Research Advisory Committee the acreage formerly allocated to a general farming programme at the Station for the production of maize, which was utilized as rations for the Cotton Industries Board's African employees, has been reduced. Part of the acreage so affected will be kept in planted pasture and part will be planted to trees, to establish supplies of firewood for the Station's African Staff.

Spinning Tests. An invaluable and necessary link at all stages of cotton plant breeding and other experimental work is the provision of facilities for small-scale spinning tests. These tests at Gatooma are now done by the Cotton

Industries Board, to whom grateful acknowledgment is hereby made. Perhaps it is not realized, as generally as it should be, that the Plant Breeders at Gatooma did not have access to any form of small scale spinning tests between the time that the Empire Cotton Growing Corporation withdrew from Rhodesia in the early 1940's and 1954 when machinery for the tests was installed at the Board's mills. The lack of small scale spinning tests facilities, over a period of some fourteen years, unavoidable though it may have been, has proved a great handicap in the cotton breeding work.

Summary of the Results for the Season

The Weather. The total rainfall at the Station for the season was 38.65 inches. The number of rainless days in each of the four months November, 1954 to February, 1955, inclusive, were 13, 8, 13 and 8 days respectively. The mean sunshine hours per day for the same months were 6.2, 4.2, 6.9 and 8.0 hours. December, 1954 was a month of particularly low average sunshine namely 4.2 hours per day.

Of the past four seasons, three have been characterized by high rainfall totals, while in the remaining one, rainfall was moderately high. The totals for the four seasons 1951-52 to 1954-55 have been 40.67 in., 42.81 in., 31.91 in. and 38.75 in. respectively.

The effect of the heavy rainfall on cotton in 1954-55 was two-fold: Lands became waterlogged and this condition retarded plant development and probably also caused a fair amount of physiological shedding; and secondly the rain itself washed off much of the insecticides applied to control cotton insect pests.

As a result of the adverse effects of excessive rainfall, yields generally were poor, but higher yields of up to 700 lb. seed cotton per acre were obtained from plants growing in limited acreas of better drained soil, and with additional insecticides.

An attempt is being made to reduce the condition of water logging in "wet" rainy seasons by a system of surface drainage. Parallel beds and finishing furrows are formed by ploughing certain lands on a mean contour of 1 in 300. Bed widths of 54 and 70 feet between furrows are being tried. The system although it provides for a maximum fall of not more than about 9 inches from the crest of the beds to the bottom of furrows, is being applied with successful practical results on farms in the area, by officers of the Conservation and Extension Department.

To minimize the loss of insecticides by the action of rainfall it is hoped to increase the "stickability" of insecticidal preparations by the addition of certain substances, which are being sought from overseas.

Plant Breeding. Lines of Albar 51 which in general possess a high degree of resistance to bacterial blight were rogued on the basis of natural infection in the leaf and boll phases of the disease. The material retained will form a source of plants for further crosses and for single plant selections. Apart from its very good bacterial blight resistance, there is good yield, ginning outturn, and lint quality in Albar 51 material, but there is doubt as to whether the jassid resistance of the strain is sufficiently good for Rhodesian conditions.

The long-term programme aimed at transferring bacterial blight resistance, from Albar 51 to strains derived from MU8A x BP52[2] is being pursued by back-crossing. Progress is being made in combining high resistance to the disease with desirable lint quality and yield characters, but it will be several years before commercial strains from this source are available.

Similarly, the transference of resistance genes which confer immunity to bacterial blight, from Knight's *G. barbadense*, BAR 4/18, to selected cultivated strains of *G. hirsutum*, which work is in the initial stages, is an even longer termed project.

Results from the plant breeding work which show promise of being useful to the grower, possibly within a few years, are emerging from comparisons in trials between the commercial 9L34 and selections made in 1952 from the same strain. A number of the selections, notably S52/36 and S52/42 have given indications of being an improvement on 9L34 in yield potential, and in spinning quality, in rain-grown district trials. The selections will again be compared with 9L34 material, but over a wider range of conditions in 1955-56; and if the 1954-55 results are confirmed, first steps will be taken to issue seed to selected growers, for multiplication.

Disease. This section of the work is concerned with bacterial blight resistance.

With the exception of a highly susceptible *G. barbadense* from the Sudan, none of the plant breeding material suffered seriously from any phase of bacterial blight attack.

As a result of experiments and observations on infecting strains artificially with the disease over the past three seasons, it has been decided to discontinue stem inoculation as a method of determining resistance. During the season, observations in a time of inoculation trial tended to support the belief that under Southern Rhodesian conditions the stem phase only occurs to any extent in physiologically mature plants. Results are tabulated in the full report of the Station.

In future, artificial infection will be induced by seed inoculation and leaf spray methods.

Insect Pests. Once again, as not infrequently happens in Rhodesia, as well as in other cotton growing countries, insect pests were one of the major factors causing appreciable loss of crop in 1954-55.

The whole range of cotton pests were present in the Station's crop, but the three bollworms, Red, Spiny and American accounted for by far the greater part of the loss by insects. More specifically, attacks by Red through the season and by American late in the season (after the planned programme of insecticidal applications had been completed), resulted in severe damage to the crop.

Insecticide Trials in the Annual Crop. DDT/BHC insecticides applied to the annual cotton at the Station, either as dust or in spray form, increased yield. The increase was greater with the sprays. But in neither instance was the increase profitable when the cost of the insecticides was taken into account, because of the poor mean yields obtained in the treated plots. The highest treatment yield in the sprayed plots was 255 lb. seed cotton per acre while the yield of comparable untreated plots was only 9 lb. seed cotton per acre.

Again, DDT/BHC dust was applied to one half of the area of each District Variety Trial. Results obtained from eight centres indicated that in all instances dusting with insecticides increased yields; but at only two centres was the result profitable.

The failure of the majority of the foregoing DDT/BHC insecticidal applications to reach a profitable level in 1954-55, is probably due to rainfall which washed off the insecticides, more especially the dusts, on most occasions soon after application.

However, in a third trial with annual cotton at the Station eight applications of 0.25 lb. Endrin per acre, or of 0.5 lb. DDT added to either 0.25 lb. Endrin or 0.25 lb. Parathion or 2.0 lb. Toxaphene, all applied as liquids, resulted in increased yields which were not only statistically significant when compared with the untreated plots, but were also profitable. The most profitable of the four treatments mentioned was that of 0.25 lb. Endrin which, for an expenditure of £5 per acre on insecticide returned a profit of approximately £3 per acre.

Nevertheless, the highest yield in the experiment was around 300 lb. seed cotton per acre, the value of which is probably only just sufficient to pay both for the cost of growing the crop and the cost of the insecticide. However, the rotational value of cotton on the yield of the following maize crop should be taken into account, and this is usually placed by experienced growers at about two bags of grain per acre. By contrast the untreated plots in this experiment yielded only 17 lb. seed cotton per acre.

An Insecticide Trial in Ratooned Cotton. A first insecticide experiment with ratooned cotton in which comparisons were made between no treatment and liquid applications of DDT, DDT/BHC and Endrin at two strengths gave encouraging results. The ratooned plants were allowed to develop a crop from the end of November, 1954, and from that time until early March, 1955, fifteen applications of the insecticides were made. Admittedly the expenditure on insecticides was rather extravagant, but there was no previous experience in the treatment of ratooned cotton on which to draw.

The untreated plots yielded 176 lb. seed cotton per acre in contrast with yields of 562 lb. and 611 lb. obtained by applying 0.2 lb. Endrin and 1.5 lb. DDT per acre respectively on fifteen occasions.

The Endrin treatment just failed to reach statistical significance at the $P=0.05$ level, but the DDT treatment was significant. Profits shown by the Endrin and DDT treatments were 88/- and 65/- per acre respectively, after subtracting the value of the seed cotton from the untreated plot together with the cost of the insecticides.

Increasing the strength of the Endrin treatment from 0.2 lb. to 0.5 lb./acre/application increased the yield from 562 lb. to 889 lb. seed cotton per acre but reduced the profit per acre from 88/- to 58/-.

Experimental treatment of ratooned cotton in 1955-56 has been extended to include a sequence of three dates of ratooning with intervals of one month, in conjunction with insecticidal tratments. The object is to control pests, reduce the cost of treatment, and induce a payable crop to ripen about April, by a system of controlled ratooning and insecticide treatment.

A study of the response of a number of strains to ratooning will also commence in 1955-56 and this work will also include assessment of lint quality.

Insecticides. Growers must always be advised that the use of insecticides should not be regarded as, possibly, a method of controlling pests and increasing yields profitably, without due attention being given to the application of recommended agricultural practices, which will result in normal, balanced, plant development, and good commercial plant stands. In the absence of adequate plant development and stands insecticides should not be applied.

Fertilizer Trials. Ten fertilizer trials were laid down in November, 1954-55. They were designed to give comparisons between the effects of varying levels of N.P.K. and to determine the optimum time for N. top dressing.

A poor first germination necessitated replanting and heavy rains still further delayed growth. Only a small crop of a few pounds of seed cotton per acre was set at the peak of bollworm attack. The trials were therefore abandoned.

CONCLUSION

The foregoing report, largely prepared by Heads of Branches and Stations, will give some impression of the many and varied activities of the Department. Particular mention may be made of the progress achieved in developing new techniques for increasing production of food crops and animal products from our poor granite soils. As this is the major soil type of the areas suitable for intensive farming this line of work is of vital importance to the future welfare of the country.

Close co-operation was maintained with the many departments connected in one way or another with agriculture and in particular the Department of Conservation. The ready and valuable assistance received from these departments is gratefully acknowledged. Finally, I wish to pay tribute to the enthusiasm and hard work accomplished during the year by the Officers of the Department.

R. R. STAPLES,
Acting Director of Research and Specialist Services.

ANNUAL REPORT OF THE DEPARTMENT OF CONSERVATION AND EXTENSION FOR THE PERIOD 1st OCTOBER, 1954, TO 30th SEPTEMBER, 1955

1. ORGANIZATION

The organization of the Department remained the same as during the previous year.

A. *Head Office*

Although an additional senior professional officer was available at head office his time was mainly devoted to the preparation of a report on an agro-economic survey of the Colony which was completed during the year.

The clerical position remained satisfactory with the exception of the records staff where the post of Supervisor was vacant for a considerable period and several changes in personnel took place resulting in delays which affected the efficiency of the office.

B. *Regional Offices*

The position in the Regional Offices remained satisfactory. Approval was obtained for part-time assistance in the offices of the Group Officers in some of the Regions. This will be of very real assistance to our work and it is hoped that it will not be long before full-time clerical assistance will be available at most Groups.

C. *Intensive Conservation Areas*

The need for alteration of boundaries of Intensive Conservation Areas still exists. In many instances this is due to the increase in farming activity and more intensive development.

In addition investigations proceeded in respect of new areas for declaration under the Act. The present position is as follows:—

(i) Declared during the year:—Darwin.

(ii) Investigated or under investigation for declaration:—

Gwaai.
Matetsi.
Ruwa.

(iii) Subdivided during year:—Nil.

(iv) Investigated or under investigation for subdivision:—

Marandellas Group.
Umvukwes.

(v) Boundaries changed:—Nil.

(vi) Investigated or under investigation for purposes of boundary changes:—

Angwa North.
Banket.
Battlefields.
Beatrice.
Bembezaan.
Bromley.
Bubi.
Enkeldoorn.
Featherstone.
Gutu.
Gwebi-Hunyani.
Gwelo East.
Inyanga.
Inyati.
Limpopo.
Lower Khami.
Lower Umgusa.
Macheke.
Marandellas North.
Marodzi Tatagura.
Matopos South.
Melsetter.
Ncema.
Nuanetsi-Mtilikwe.
Sabi Catchment.
Selukwe.
Tokwe.
Umshandige.
Umtali North.
Umtali South.
Umvuma.
Wenimbi-Ruzawi.

(vii) Areas declared to date:—

Same as previous year.

D. *Intensive Conservation Area Committees*

In most areas the Committees gave active support to Conservation Officers in carrying out their duties. Some Committees continued visiting farmers in their areas and this is to be commended. Such visits are stimulating to the farmers and it certainly enables the Committee to deal with their problems in an effective manner.

Several Committees continued regular flights over their areas once or twice a year while others have followed this example with great success.

Most Groups are functioning well and in some cases there has been a complete revival of activities. This is most pleasing and in the interest of the work of this important organization.

Group as well as I.C.A. Committees have been most helpful in the organization of farmers' days and demonstrations in their areas. These have stimulated very considerably interest in better farming methods.

A major problem in many areas is still the shortage of Conservation Officers to assist the Committees with their work. In a number of areas there are now from 150 to 250 farmers, and Committees as well as Conservation Officers find it impossible to give the necessary individual assistance required.

2. STAFF

(a) *Establishment*

The staff position during the year was as follows:—

	Authorized 30.9.54	*Authorized* 30.9.55	*Requirements*
Administration (Including Professional Staff at Headquarters)	15	15	15
Regional Clerical Staff	9	9	9
Regional Conservation and Extension Officers	4	4	4
Group Conservation and Extension Officers	13	13	14
Assistant Group Conservation and Extension Officers	17	17	19
Conservation and Extension Officers	74	74	90
Animal Husbandry Officer	1	1	1
Chief Conservation Engineer	1	1	1
Conservation Engineers	3	3	4
Agricultural Engineer	1	1	1
Mechanical Engineer (seconded from C.M.E.D.)	1	1	1
Irrigation Officers	2	2	2
Young Farmers' Clubs Organizers	1	1	2
Chief Tobacco Extension Officer	1	1	1
Tobacco Extension Officer	1	1	1
Draughtsmen	2	2	5
Farm Managers and Assistants	4	4	4
Information Officer	—	—	1
Mechanical Unit Inspectors	4	4	4
Horticulturist (seconded from Department of Research and Specialist Services)	1	1	1
Soil Technicians	—	—	2
African Peggers	—	6	12
TOTALS	155	161	194

With the exception of the additional new posts for African Peggers there has been no change in the staff position. The work of this Department is still seriously hampered due to the shortage of field officers and this must reflect on the agricultural development of the country as a whole.

(b) *Visits to other Countries*

Uganda. The Chief Conservation Engineer attended a Conference on Farm Mechanization in Uganda during the year. On his return he spent a few days in Kenya to investigate the hydrological work carried out by Dr. Perreira.

U.S.A. Mr. Hack, Group Conservation and Extension Officer is on a visit to the United States under F.O.A. assistance for the purpose of studying land-use planning and farming techniques.

Two technical assistants Messrs. Reid and Kennard are in the States working on irrigation farms and studying irrigation methods.

United Kingdom. Officers on long leave in the United Kingdom were given the opportunity of studying particular problems.

Union of S.A. The Horticulturist visited the Union in order to study pine-apple production.

The Assistant Director attended the Afrikander Cattle Exhibition in Bloemfontein as a guest of the Society.

(c) *Departmental Committees*

The Director served on the following Committees:—

(i) Federal Standing Comittee on Agricultural Production.
(ii) Livestock Improvement Comittee (Chairman).
(iii) Natural Resources Board (advisory).
(iv) Tobacco Research Board.
(v) C.M.E.D. Co-ordinating Committee.
(vi) Water Resources Committee.
(vii) Sabi Valley Co-ordinating Committee.

The Assistant Director served on the following:—

(i) Council of Y.F.C. Organization.
(ii) Natural Resources Board Committee on Subdivision of land.
(iii) Whole Farm Development Scheme Committee.
(iv) Sabi Development Farm Advisory Committee.

The Chief Conservation Engineer served on the Education Sub-Committee of the Natural Resources Board and the Inter Government Committee on Hydrology.

In addition Senior Officers regularly attended meetings of Committees and Conferences of this Department as well as other departments in an advisory capacity.

The Animal Husbandry Officer continued to serve as secretary to the Livestock Improvement Committee.

(d) *Publications*

The Department was responsible for the following publications:—

(i) Maize Harvesting in Southern Rhodesia — Ffitch B. J., R.A.J., Vol. 52, No. 2. March-April, 1955.
(ii) Contour Ridge Layout in Mashonaland — Wiggill M. D., R.A.J., Vol. 52, No. 2. March-April, 1955.
(iii) Numerous articles and notes by officers of the Department appeared in the *"Rhodesian Farmer"* and other publications.
(iv) Farmers Digest.

3. TRANSPORT

A further substantial improvement in the transport position took place during the year. This was mainly due to the fact that a considerable number of officers acquired their own vehicles as a result of loans being made available to them by Government. This scheme can be said to be a complete success. Not only is it popular with the staff, but it has greatly improved the efficiency of the field services.

The Department now uses 33 C.M.E.D. owned and serviced and 103 authorized privately owned vehicles. The reduction in number of C.M.E.D. vehicles has also had the effect of improving the serviceability of the remaining ones.

4. EXPENDITURE

Vote	Item	1954–55 Authorized	1954–55 Actual	1955–56 Authorized and Anticipated Expenditure
		£	£	£
A	Salaries, Wages and Allowances	171,232	160,720	182,617
B	Subsistence and Travelling	13,000	10,845	14,000
C	Camp Equipment	750	487	750
	Experimental Equipment	4,000	3,796	3,400
	Leave Entitlements	520	540	800
	Office and Miscellaneous	1,000	1,290	1,250
	Instruments	1,000	1,083	2,500
	Recruitment	650	1,384	1,250
	Water, Light and Sanitation	—	—	1,230
D	Housing	16,000	17,230	16,000
E	Section 23 of the Natural Resources Act	10,000	5,233	15,000
	Other Works and Measures	11,000	10,492	11,000
F	Chipinga Demonstration Farm	6,500	6,500	5,810
	Karoi Demonstration Farm	4,500	4,780	5,285
G	Livestock Improvement Scheme	9,000	7,486	9,000
H	Transport and Equipment Hire	75,000	69,446	76,000
J	Conferences	1,000	649	—

Farm Equipment and Transport Hire. (Now on main H Vote).

5. THE AGRICULTURAL INDUSTRY

The past year has had its periods of expansion and reduction in many of the branches of the agricultural industry due to fluctuations in the prices of various commodities. The beef industry especially has been unstable and many farmers are not feeding for the market any longer.

In addition, the climate influences the industry more than anything else, but on the whole it has been a favourable year and production fairly stable. A record tobacco crop has been reaped and the maize crop was more than adequate to meet the requirements of the country.

With the increased demands on foodstuffs there is every indication that production must be stepped up considerably in the future in order to retain the present balance. Good progress is being made in respect of improved land-use methods and techniques of soil and crop management, but there is room for improvement on most farms.

Labour is becoming increasingly difficult for agriculture as a result of the expansions in industry and the major Government developments drawing labour at higher rates of pay which agricultulre cannot afford.

The following tables give an indication of the gross value of agricultural output between the years 1939 and 1954.

Item	1938 £1,000	1949 £1,000	1953 £1,000	1954 £1,000
Pastoral and Dairying—				
Dairy Produce	199	670	1,190	1,315
Cattle Slaughterings	832	1,884	4,442	5,050
Sheep	23	92	120	137
Goat Slaughterings	3	14	23	24
Pig Slaughterings	66	345	982	1,025
Eggs sold	64	240	281	265
Other	303	555	1,172	1,304
TOTALS	1,490	3,800	8,210	9,120
Crops and Orchards—				
Maize (grain)	621	2,023	4,871	5,420
Tobacco	1,162	10,944	17,395	19,256
Potatoes	55	186	233	301
Wheat	40	12	26	39
Groundnuts	18	23	76	91
Cotton	2	52	80	41
Citrus	53	91	236	244
Other crops, etc.	359	1,919	3,095	3,098
TOTALS	2,280	15,250	26,010	28,490
TOTAL GROSS VALUE	3,770	19,050	34,220	37,610

This table indicates a steady increase in value in respect of all commodities and is a result of both increase in total production as well as an improvement in the price structure. Needless to say it is imperative to retain a sound balanced price structure in order to secure the required development and production.

6. GENERAL AGRICULTURAL CONDITIONS

(a) *Climatic Conditions and General*

The Colony as a whole was again blessed with an exceptionally good year for agricultural production. In most parts the rainfall was above average and crops were good to excellent with isolated failures due to excessive moisture. Water supplies and grazing were good throughout the year.

(i) *Mashonaland*

The season as a whole was above average although droughty conditions prevailed around Salisbury during December, necessitating replanting of maize crops. Rains continued later than usual and falls were recorded even in June.

The winter was very mild except for sharp late frost in August and September causing considerable damage to certain vegetable crops, e.g. potatoes and also to wheat.

Water supplies were good and no difficulties occurred in respect of irrigation or stock watering.

(ii) *Midlands*

For this region the summer season was well above the average and good crops were produced with the exception of portions of the Umfuli Group where the water table rose to the surface and crops suffered badly and on some poorly drained sandy soils in the Gwelo and Charter Groups.

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The winter was mild and good grazing conditions prevailed until spring when sharp frosts occurred causing loss of irrigated crops and a set-back to the veld and livestock.

(iii) *Matabeleland*

The past year was the wettest year on record for many years in Matabeleland. The rains commenced in October and carried on until March and even June in some parts.

The winter was mild except again for heavy frost in August causing considerable damage to irrigated crops and veld.

(iv) *Eastern Region*

General planting rains were rather late, but continued throughout the season causing some water-logging in many parts on the sandy soils, particularly those not well drained.

October temperatures were high, but for the rest of the season were pleasant. The winter too was mild except for the late frost in August which caused damage to vegetable crops over a wide area.

(b) *Crop Production*

(i) *Food Crops*

Maize

Although the season could not be described as ideal for maize due to excessive rains in many parts followed by disease and pests, nevertheless a very excellent and near record crop was reaped.

In some parts very high yields were obtained due to good soil and crop management practices where water-logging did not occur. More and more maize producers on the red soils now pay particular attention to good stands, correct plant populations and sound fertilizer applications with very encouraging results.

In the sandveld areas the maize was generally poor due to excessive moisture and low fertility. An increasing number of farmers, however, are getting yields of from 20-30 bags per acre on these soils. It is of interest to note that one farmer reaped 450 bags on 10 acres of ordinary granite sandveld under good management and with a high application of fertilizer.

Helminthosporium was prevalent throughout the country and in some areas the crop was reduced considerably as a result. It is certainly becoming one of the major problems of maize production and it is essential that resistant varieties should be developed as early as possible.

Generally speaking there is a vast improvement in maize production techniques but there is still room for more improvement especially in respect of soil management.

Sorghums

The growing of sorghums has lost favour over the last few good rainy seasons because maize production has been quite successful in the lower rainfall regions. In some isolated cases farmers have continued to produce good crops. The main problem to overcome is still the bird menace.

Munga

This is still a minor crop on European farms although it is quite popular in tobacco rotations as a result of the findings of the Tobacco Research Board of Rhodesia and Nyasaland.

Groundnuts

The growing of groundnuts is becoming more popular mainly for the purpose of supplying the requirements of labour. Production this year has been reasonable although the crop was affected by excessive rains in some areas.

Wheat

There has been a slight increase in the acreage of dryland wheat in some parts due to the higher moisture content of some vlei areas. Generally this crop is losing favour, mainly due to the price structure in relation to other crops. In the Umshandige Valley barley has practically entirely replaced wheat under irrigation.

The late frost which was countrywide during the year caused serious damage to the wheat crop in several areas and in some cases the crop was completely lost.

Potatoes

The major summer crop as well as the early winter crop were both affected by late blight which reduced the yields by as much as 60% and 40% respectively. It is most essential that resistant varieties should be made available at an early date. Some of the new varieties are most promising but this is a matter requiring special attention by the Research Department.

The late frost in August also caused severe damage to the winter irrigated crop in many parts and consequently there has been a serious shortage of table potatoes in the country.

Good progress is being made with the production of seed potatoes in the Eastern districts and with more experience we can look forward to a substantial increase in production.

There is no doubt that there is a marked improvement in the management and handling of the potato crop in the Colony.

Vegetables

In some areas there is an increase in the production of vegetables and a definite improvement in management and marketing. In other areas such as Umshandige, and parts of Matabeleland there has been a decline in production mainly due to marketing problems.

With the possible development of canning facilities in Salisbury there is bound to be an expansion in production in this area. In the Eastern Region there is steady progress as a result of the marketing facilities and assistance by the field staff of the Department.

The late frost in August and September caused considerable damage to vegetable crops in most areas, and this was a severe blow to growers as well as to the dehydration and canning factory.

Fruit

There is a definite increase in the planting of fruit trees, especially citrus, where irrigation is available. Great interest has been shown in the production of bananas in the Eastern Region and with the plantings undertaken we can expect that this area will in future supply a large portion of the country's requirements.

As far as deciduous fruits are concerned progress is slow although orchards receive more attention and management is improving. Diseases and insect pests remain a problem. Increased investigation and research appear necessary.

(ii) *Cash Crops*

Tobacco

(Figures in brackets represent totals for 1953/54 season.)

For the third consecutive season the crop of the past season has again broken records for total yield and value.

This crop has been described as the best ever to be sold over the auction floors and our tobacco farmers are to be heartily congratulated in achieving this result despite an adverse season. This is in no small way attributable to the findings of the Tobacco Research Board and fully justifies the faith of the Rhodesia Tobacco Association and the Government in the work of this excellent organization.

The season generally started early and most farmers made full use of the opportunity offered. By the end of November not less than 65% of the crop had been planted while between 40-45% of the crop was planted with the early November rains.

Supplementary irrigated tobacco, while still only a small percentage of the whole crop, is liable to assume greater and greater importance in the future.

Planting with water both before and after the rains is considered to be one of the major advances in planting flue cured tobacco. This was tried on a relatively small scale and is expected to increase rapidly in importance this coming season. Hail damage was fairly localized and was much less severe than during the 1953/54 season. A total of 71% of the farmers insured against hail which is an increase over the previous season's figure of 61%.

The past season has shown real advances in seedbed management, early planting, improved stands, insect and disease control, and rotations for tobacco.

Wide interest in rotations of tobacco, particularly with grass, has been apparent. Farmers in general are thinking more about this most important aspect of tobacco production. The use of second year land while still considerable is rapidly declining and it is probable that in a few years this practice will have practically died out. Increased interest in stock has also been apparent.

Land preparation and selection have improved but far more attention by farmers to this aspect will greatly improve yields.

The weather during December and the first half of January was extremely unfavourable. Rain and overcast skies characterized this period but from mid January until early May weather conditions were very favourable and the crop responded well. Late plantings showed up well but farmers are warned that such conditions seldom occur and this should not encourage farmers to risk planting

after mid December. There is still, however, a general lack of barns and farmers would be well advised to allow one barn to five acres if at all possible. If the target of 140 million pounds is to be achieved it is essential that more barns be built. The amount of tobacco graded commercially was considerably below normal and the general standard of commercial grading showed improvement. Farm grading on the other hand showed no such advance. It has been estimated that bad grading reduced the average price per pound by as much as 3d., which was equivalent to £1,507,000 on the whole crop. Such a loss is more than the country or producers can afford. An appreciable drop in the amount of nondescript tobacco was recorded. It is, however, still undesirably high.

Field trials were conducted for demonstration purposes and engendered a lot of interest locally.

The number of growers during the past season was 2,512 (2,553), total area planted was an estimated 173,000 (168,424) acres and the yield (estimated) was 697 (718) lb. per acre. A record crop of 120,582,930 (120,251,036) lb. was sold for £20,327,870 (£19,212,635) at an average price per pound of 40.26d. (38.35d.). The average size of crop was 69 (66) acres per grower and the average income was £8,090 (£7,201) or an average of £112 (£111) per acre. There is every reason to hope that over the next two seasons the average yield should rise to be in the neighbourhood of 800-900 lb. per acre. The work of the extension officers advising on tobacco has again proved of great value and the proportion of visits made by request has showed an increase and is well over 50% of all farm visits.

The figures for dark fire cured were, sold weight 276,726 (590,060) lb. and sold for an average of 16.30 (10.69)p. per pound. The crop was grown on 460 (980) acres by 17 (29) growers. The average yield per acre was 602 (613) pounds per acre. This crop still appears to be uneconomic despite the better average price.

Turkish Tobacco again featured mainly in the Darwendale area. There was a total of 186 growers, including 106 African growers, who produced an estimated 125,000 pounds. The increased interest in Matabeleland did not materialize but increased interest does seem to be present in the Gwelo and Fort Victoria area.

Cotton. Very little interest exists in the growing of this crop mainly because of insect damage, particularly Red Bollworm.

Lucerne. Farmers are showing an increased interest in the production of lucerne both under irrigation and on dryland. Every effort is being made to assist growers with the best available information. There is little doubt that there is a great future for this particular crop in our agricultural industry.

Tea. This has been a good year for tea production in the Chipinga area and the crop exceeded the million pound mark in weight. Further development for supplementary irrigation is being undertaken by the Estates in this area.

The planting programme for the Inyanga area is well under way and the season has been excellent for this purpose.

Coffee. This crop is again attracting interest and large plantings of Kenya seed are under way in the Melsetter and Chipinga areas.

Castor Bean. The trials with castor bean were rather disappointing and very few farmers are prepared to carry on with the crop. As more experience is obtained future development will be on sound lines.

Rice. Besides the Zambesi River project, where a good crop was reaped, there is very little expansion in the acreage under rice. It is doubted whether this crop will ever be of importance on European farms.

Grass Seed. The first season of a newly organized industry proved satisfactory. Certain difficulties were encountered and further research is necessary. Indications are that the commercial seed producer should be able to obtain 100-200 lb. of seed per acre.

Officers of this Department assisted as inspectors for the Association.

Timber. The year has been very favourable for planting and besides the large scale planting by the Forestry Commission and Commercial concerns, farmers have planted on a small scale in many areas.

The development of farm plantations to supply home requirements is essential and to encourage the planting of trees small nurseries have been established in some areas by I.C.A. Committees.

(iii) *Stock Feed*

Grass is the most important of the feeds and established pastures are now to be seen on many farms. Grass silage is becoming more popular and Napier, Rhodes, Star and other grasses are planted for this purpose.

Maize or maize-legume silage is still very popular and is being made extensively. Due to the wet season, silage making was difficult if not impossible on some farms, and thus the output was not as much as was expected.

Hay making was difficult during the year and on some farms legumes were made into silage instead of hay, as curing was impossible. There is, however, a general interest in fodder production and conservation.

Greater interest has been shown in the growing of fodder crops under irrigation, and it is not uncommon to see lucerne or grass-clover pastures growing under overhead spray irrigation, especially on dairy farms. In the more intensive areas the forage flow throughout the year has been improved by utilizing the veld, pastures, silage and hay on a planned basis.

(c) *Livestock*

This year has been good for livestock, except that during spells of excessive rains the animals suffered and the control of ticks and other parasites was difficult and sometimes impossible. Grazing conditions were generally good, especially in view of the mild winter experienced.

(i) *Cattle*

Beef Production

There has been a lot of debate and uncertainty in the minds of farmers about the stability and future of the beef industry. This has had an undesirable effect on the progress of cattle farming in general and especially in respect of the feeding of slaughter stock. It is hoped that this problem will be settled shortly and that Government will be able to announce a definite and realistic policy for the future.

Progress in management has been maintained and improved although a lot remains to be done. There is more interest in the use of better bulls, dosing for internal parasites, dehorning, culling, selection and feed production, but far too many of the farmers still run cattle without proper management and attention.

It is the intention of the Department to embark on a definite programme of livestock improvement and increased production during the coming year and field officers will carry out this programme with the assistance of specialists, the support of the I.C.A. Committees, Farmers Associations and our most experienced farmers.

Dairy Cattle

There was a steady improvement in the management of dairy herds, and it is pleasing to report that the propaganda in regard to provision of home-grown feeds, especially roughage, has had good effect on many farms.

The health of dairy stock is also improving due to more systematic dosing, inoculation and improved veterinary services through the private organizations of stock owners.

The rearing of calves and feeding of young stock is still a matter that should receive more attention, and through the dairy bonus scheme this aspect is being pushed as hard as possible.

(ii) *Sheep*

In certain areas there has been a revival of interest in sheep especially with the establishment of improved pastures. There is little doubt that small flocks of sheep could be a most useful and profitable sideline on many farms. The difficulties seem to be mainly lack of care and management and provision of a certain amount of winter feed. Blackhead persians are still the most popular although there is increased interest in the Dorper and German Merino.

During the heavy rains the sheep certainly did not thrive and where management was bad losses occurred.

(iii) *Goats*

In isolated cases farmers maintain small flocks of goats and these were most valuable for boys meat. There also exists an excellent market for goat meat. Generally there is not much interest in goats except under special circumstances.

There seems to be more interest in milch goats lately especially in the vicinity of the towns as these are rightly termed the "plotholders cow".

(iv) *Pigs*

The decline in pig production which started last year continued during the year and many individuals have gone out of production. There has been a revival lately as a result of a change in the price structure and marketing organization. Satisfactory expansion can be looked forward to in the future.

An important weakness is that much of our production is off purchased rations whereas the bulk should be farm produced and only protein concentrates bought. The Pig Research Station will undoubtedly be of great help and assistance to farmers in the future especially in respect of management and feeding techniques.

The Landrace breed is gaining in popularity and is being introduced by more and more producers. Agalactia is still a problem in certain areas and severe losses have occurred.

(v) *Poultry*

Poultry production seems to have stabilized itself to quite an extent during the year. The better producers are now well established and able to stand the fluctuation in egg prices. There has been a general improvement in management and in some cases the deep litter system proved most successful.

(vi) *Fish*

There has been very little progress in fish farming although the interest in stocking dams remains. Fingerlings are now supplied from Henderson Research Station, the Chipinga Demonstration farm and by private farmers. On many farms native labourers are now allowed to fish the dams. This is undoubtedly a most valuable asset to the farmer in improving the diet of the labourers and also to bring about stability and happiness especially in so far as the women and children are concerned.

(vii) *Livestock Improvement Scheme*

The operation of this scheme continues to be the function of this Department and with additional assistance in the field there is a steady increase in applications for grants on bulls from new breeders. This is a healthy sign and an indication of more interest and attention to livestock in the Colony. The Committee actually dealt with applications for grants on 236 bulls and 129 females as against 348 bulls and 119 females during the previous year. The Committee also advised the Minister on the importation of stock, both pedigree and grade, from the Union of South Africa.

The importation of breeding stock from the Union was again on a quota basis with the difference that grade bulls were excluded and grade beef female stock were included in the quota this year.

This year, for the first time, no member of the Committee attended the sales in the Union as there were very few requests for purchases by farmers through the Committee. In many instances farmers are buying direct from breeders in the Union, but there is no doubt that local breeders are beginning to satisfy the demands of the Colony which is a move in the right direction.

The following tables indicate the position of importation during the year.

Stock Purchased and Imported for Farmers

	1.10.54 to 30.9.55	1.10.53 to 30.9.54	1.10.52 to 30.9.53
Pedigree bulls	3 for £900	37 for £6,811 10s.	61 for £7,076 15s.
Grade bulls	3 for £210	—	—
Pedigree Females	—	—	12 for £1,788
Grade Females	147 for £7,519	199 for £9,747	169 for £7,468
TOTALS	153 for £9,259	236 for £16,558 10s.	242 for £16,332 15s.

Details of Breeds

	1.10.54 to 30.9.55	1.10.53 to 30.9.54	1.10.52 to 30.9.53
Pedigree Bulls—			
Friesland bull	1 for £630	10 for £3,140	24 for £3,292 10s.
Jersey bulls	—	1 for £175	19 for £1,330
Aberdeen Angus bulls	—	1 for £262 10s.	—
Africander bulls	2 for £900	16 for £2,227	10 for £1,078
Hereford bulls	—	2 for £283 10s.	1 for £178
Red Poll bulls	—	1 for £73 10s.	—
South Devon bulls	—	6 for £650	—
Sussex bulls	—	—	5 for £304
Brown Swiss bulls	—	—	2 for £393 15s.
TOTALS	3 for £1,530	37 for £6,811 10s.	61 for £7,076 5s.
Grade Bulls—			
Africander	3 for £210	—	—
Pedigree Females—			
Friesland heifers	—	—	8 for £1,353
Jersey Heifers	—	—	4 for £435
TOTAL	—	—	12 for £1,788
Grade Females—			
Friesland heifers	103 for £5,319	79 for £3,667	92 for £3,728
Jersey heifers	44 for £2,200	120 for £6,080	77 for £3,740
TOTALS	147 for £7,519	199 for £9,747	169 for £7,468

Sheep Purchased

	1.10.54 to 30.9.55	1.10.53 to 30.9.54	1.10.52 to 30.9.53
German Merino Rams	2 for £50	—	3 for £60
Ronderib Rams	—	2 for £10	—
Dorsian Rams	—	2 for £20	—
Persian Rams	—	7 for £102 10s.	—
Persian Ewes	—	110 for £540	70 for £320
TOTALS	2 for £50	121 for £672 10s.	73 for £380

Importation of Stock

The number of stock imported from the Union by the Committee and by farmers is as follows:—

	1.10.54 to 30.9.55	1.10.53 to 30.9.54	1.10.52 to 30.9.53
Pedigree Bulls—			
Ayrshire	5	6	8
Friesland	34	17	42
Guernsey	4	4	3
Jersey	12	11	31
Aberdeen Angus	—	1	—
Africander	173	234	132
Hereford	3	20	11
Shorthorn	2	1	1
Sussex	7	14	5
North Devon	—	—	6
South Devon	—	6	8
Red Poll	1	1	—
Brown Swiss	6	1	4
Drakensberger	—	6	—
TOTALS	247	251	331
Pedigree Females—			
Ayshire	32	42	41
Friesland	33 + 1 calf	47	93 + 6 calves
Jersey	70	32	30 + 2 calves
Guernsey	11	6	4
Africander	92 + 1 calf	86 + 4 calves	114 + 8 calves
Hereford	14	—	33 + 6 calves
Shorthorn	—	14	7
South Devon	—	10	6
Sussex	—	15	6
Brown Swiss	2	—	—
TOTALS	264 + 2 calves	252 + 4 calves	334 + 22 calves
Grade Females—			
Ayrshire	13	—	22
Friesland	500 + 9 calves	365 + 7 calves	241 + 9 calves
Jersey	334	276 + 3 calves	129 + 4 calves
Africander	20	—	—
Brown Swiss	8	—	—
TOTALS	875 + 9 calves	641 + 10 calves	392 13 calves

In addition to the above importations made from the quotas given by the Union Department, the following stock were imported from outside the Union quota as a special concession to persons migrating to Rhodesia and bringing up some of their own stock. Only grade stock was brought up in this way.

	1.10.54 to 30.9.55	1.10.53 to 30.9.54	1.10.52 to 30.9.53
Firesland heifers	15	73	47 + 1 calf
Jersey heifers	9	53	49 + 30 calves
Africander heifers	20	—	—
Brown Swiss heifers	7	7	—
Africander bulls	20	—	—
Shorthorn bulls	13	—	—
Shorthorn x Africander bulls	9	—	—
TOTALS	83	133	96 + 31 calves

Imports of Stock from the United Kingdom were as follows:—

	1.10.54 to 30.9.55		1.10.53 to 30.9.54		1.10.52 to 30.9.53	
	Bulls	Heifers	Bulls	Heifers	Bulls	Heifers
Ayrshire	2	16	—	14	1	—
Friesland	—	—	1	—	—	4
Jersey	—	31	8	62	1	8
Aberdeen Angus	3	—	1	—	—	—
Hereford	3	5	3	—	—	—
Shorthorn	1	2	—	—	1	4 + 1 calf
Sussex	—	—	—	1	—	—
TOTALS	9	54	13	78	11	16 + 1 calf

Although the numbers imported show a decrease on last year it must be noted that the importations were all made by private individuals, whereas last year the Rhodesian Jersey Cattle Club made importations and then held sales where farmers purchased the animals.

7. PRODUCTION FROM IRRIGATION

Interest in irrigation has continued in spite of the good season. Many more schemes have been started and field officers devote a far greater proportion of their time to the development and layout of irrigation projects.

In the tobacco areas the main object is to establish a small acreage of irrigated tobacco to be followed by pasture or winter fodder for cattle. In the Matabeleland area the irrigation schemes are mainly developed for fodder production and for maize in preference to cash crops.

The Irrigation Officer has been extremely busy during the year in assisting farmers and arranging further training of field officers. He made a total of 262 visits to farms to help and guide farmers in the efficient use of irrigable land.

During the last season approximately 2,000 acres of supplementary irrigated tobacco were planted and the indications are that this acreage will continue to increase in the future. Good results have been obtained from maize with supplementary irrigation and yields of 30 bags per acre are now quite common. This is of particular importance in the lower rainfall regions where a satisfactory crop can now be assured.

There is also an ever increasing interest in respect of irrigated pastures and fodder crops. Lucerne as well as grass-clover pastures are the most popular for this purpose. The actual management of these crops still requires a lot of investigation.

(a) *Umshandige Irrigation Scheme*

The farmers under this scheme had another successful season. The water supply was adequate and consequently improvement could be maintained. Most of the farmers have changed from wheat production to barley due to the price structure. Some successful tobacco crops were also produced this year and additional plantings will be made during the coming season.

(b) *Umgusa Scheme*

Dairying has become the main method of production on this scheme and as a result of this the acreage under fodder crops and lucerne has increased considerably. Vegetables are still a good side line although the heavy rains during the summer made production difficult for that period. The winter production on the other hand was excellent.

(c) *Lower Mazoe Coloured Settlement Scheme*

Good progress can be reported in respect of this scheme and the settlers are finding their feet both in respect of soil and crop management in addition to running their own business as producers.

Further improvements in respect of lay-out were effected and consequently control and use of water is much better. Crop yields have been excellent and there is no doubt that this little project is well on its way to success. The Management Committee and especially the local Conservation Officer deserve credit for their achievements this year.

(d) *Sabi*

Good progress has been made with the development of the Sabi Development farm which is nearly ready for occupation. All the buildings are erected, the distribution furrows constructed, the lands cleared and levelled, and final planning and water levelling are now in progress. It is intended to advertise the farm shortly and it is hoped that a suitable tenant will be obtained, as the success of the project will largely depend on the individual operating it.

8. SOIL CONSERVATION

(a) *Arable Areas*

(i) *General*

Under this heading the mechanical measures for controlling erosion will be reviewed. This must not be allowed to obscure the fact that the most basic need for controlling erosion is an allround improvement in farming standards. The careful selection of land for the purpose in view, the use of land for the purpose to which it is best suited, the management of land at a high level of productivity, the proper integration of land, crops and animals are all vital factors in the control of erosion.

The policy of farm planning, reported on under "Advisory Services" paragraph (b) of this report, should do a great deal to curb erosion. There is no single factor that influences erosion as profoundly as cover. In order to reduce erosion, cover on the land must be maintained at as high a level as possible. The primary requirements for this are:—

(a) Maximum production per acre in order to reduce the number of acres ploughed each year and yet maintain total production.
(b) Good stands and high fertility in order to ensure maximum cover from the crop.
(c) Early planting to secure early cover.
(d) Rotations including a maximum of perennial grasses and fodder crops.
(e) Mulching with crop residues to give cover in the early part of the season when crops are still young.

Erosion from roads continues to be a major problem in which Road Council roads and farm roads are the worst offenders. This problem is intimately bound up with the financial ability of Road Councils to do the necessary preventive work and the interest of landowners in this aspect of their farming activities.

(ii) *Mechanical Protection of Arable Land*

Progress was well maintained in this field during the year as the following table shows:—

Region	Period	Contour Ridges and Storm Drains	Bench Terraces	Irrigation Furrows	Pasture Furrows and Veld Ripping
		Miles	*Miles*	*Miles*	*Miles*
Mashonaland	1952–53	2,907	13	16	8
	1953–54	3,362	15	51	2
	1954–55	2,658	1	62	7
Midlands	1952–53	1,170	90	23	29
	1953–54	853	2	35	1
	1954–55	1,290	3	43	—
Matabeleland	1952–53	265	3	36	943
	1953–54	222	6	42	1
	1954–55	220	3	15	—
Eastern	1952–53	1,156	15	24	8
	1953–54	1,334	10	27	—
	1954–55	1,792	3	33	8
TOTALS	1952–53	5,498	121	99	988
	1953–54	5,711	33	155	4
	1954–55	5,960	10	153	15

The proper management and protection of native lands on European farms continues to receive attention and whilst progress has been made in this field there is no cause for complacency and much remains to be done.

(iii) *Roads and Railways*

Many miles of farm roads were re-aligned and protected by proper drains during the year.

Liaison with Roads Councils has been maintained, but more active co-operation from quite a few Councils is essential.

Co-operation with the Roads Department and with the Railways administration has continued and is proving most valuable.

(iv) *Research*

The overall plan for the experiments continued, that is the Series I experiments (Tatagura soil) were taken through their second season, the Series II experiments (Heavy red soil) were completed in November, 1954, and in operation for their first season, and Series III and Series IV (Two different types of Sand Veld) have been under construction since August, 1955, and it is hoped to bring them to a stage where at least preliminary observations will be made during the coming 1955-56 season.

Work is also in progress on two field scale experiments to measure runoff from stubble mulched maize lands, and veld under different grazing levels.

SERIES I. EXPERIMENTS (ON TATAGURA SOIL)

Certain modifications were made for the 1954/55 season, chiefly additional flow recorders, covers for the collecting troughs, and improved screens. The collecting tanks were completed before the rains for the stubble mulched maize and star grass rotation plots.

No startling results appeared because the season was most unusual, in that although the total rainfall was high (44 inches), no heavy storms occurred. The most important results were:—

(a) Runoff and erosion were greater from maize plots after the green crop, than from maize after maize. It is presumed that this is the effect of the very severe battering received by the green crop plots the previous year, as a result of poor cover in the early part of the season because of late planting.

(b) Both runoff and erosion were almost eliminated by the combined treatments of stubble mulching and high maize population (15,000 plants per acre). The relative figures are:—

	Yield (bags per acre)	*Runoff (inches)*	*Soil Loss (tons/acre)*
Maize (After sunnhemp) 10,000 plants per acre	28	10	5·5
Maize (After maize) 10,000 plants per acre	25	7	1·7
Maize (After maize) 15,000 plants per acre	43	0·7	0·3
2nd Year Napier Grass	—	1	0·2
2nd Year Star Grass	—	2·5	0·02

All these plots are on a 6½% slope.

The interesting result from the mulched plot has led to the installation of two additional plots on a 4½% slope, with the crop treatments maize continuous at 15,000 plants per acre.

(a) With stubble mulch.
(b) With maize stover removed. These plots will make possible the separate assessment of the effects of (a) mulching; (b) plant population.
(c) Fertilizer rates.

Experiments 2, 3 and 4

The conversion of these experiments from recording and loss only to recording both runoff and soil loss was completed for the season.

The results show no significant changes from those of the previous year. A further modification has been carried out this year, consisting of fitting hinged lids over all the collecting tanks, to obviate a correction for direct rain into the tanks.

Experiment 4

Continuing the plan for this experiment, the next group of ten plots are now under construction. The very large volume of construction work this year makes it doubtful whether the tanks will be completed before the rains, but the crop treatments will be applied to give uniformity next year.

SERIES II

Experiments 6 and 7

(Which are duplicates of Experiments 1 and 3 on red soil) were completed for the 54/55 season. Results from Experiment 7 were discontinued when additional levelling became necessary during the season. As this was the first season the results from Experiment 6 will be taken as indications only. The greatest drawback to the effectiveness of this series is the necessity to use inbred varieties of maize due to the proximity of the maize breeding lands. inbred maize will be used again for the 55/56 season, but after that it is hoped to be able to use commercial maize.

Experiment 8

This experiment has still not been installed but may be for the season 55/56 if other commitments permit. It consists of a number of replicated miniature plots measuring runoff and soil loss.

SERIES III AND IV

Two types of sandy soils occur on the Station, viz. steep well drained soil up towards the foothills, and flatter poorly drained areas lower down the slope. Since neither can be said to be typical sandveld, experiments are under construction on both. Initially the large scale 1/20 acre plots will be installed, concerned chiefly with maize growing practices and methods of tobacco growing. Provision has been made for additional small scale experiments to be added later. It is hoped to bring both series to a stage where at least a partial record is obtained during the 55/56 season. Both series are of a new design using an im-

proved system of tanks and divisors which allows all the recording to be taken under cover in one central building, incorporating an office.

The present access to the sandveld being very inadequate, a great deal of effort is going to the construction of 2 miles of new road with a 60 foot, 6 span bridge and 4 major culverts.

FIELD SCALE EXPERIMENTS

(a) *Stubble Mulching Trials*

Since it is not possible to apply field scale mulching treatments to the 1/20 acre plots, three large plots of approximately 4 acres each are being laid out to test two methods of mulching against a normal maize/green crop rotation.

The first season will be a uniformity trial and the installation will be completed during the season. Initially, runoff only will be measured, but eventually it will be possible to modify the experiment to record soil losses.

(b) *Grazing Experiments*

A field scale experiment to measure runoff under different grazing treatments is planned and will be installed as soon as possible. It is unlikely that this will be ready for the 1955/56 season.

AUXILIARY INVESTIGATIONS

Exploratory work has begun on:—

1. Soil moisture determinations.
2. Canopy interception.
3. Density of cover.
4. Infiltration, using concentric ring type infiltrometer.

In each case all that can be done at the moment is an initial exploration of methods of approach, as each of these subjects if properly pursued would wholly occupy a research officer.

PROGRAMME AND STAFF

The projects now receiving attention are:—

1. Development of technique of emptying and recording which will allow chemical and mechanical analysis of eroded soils.
2. Completion of Series III and IV. Major experiments only.
3. Construction of road and bridge.
4. Experiment 1. Two additional plots.
5. Experiment 4. Ten additional plots.
6. Experiment 8. 36 Plots.
7. Field scale mulching plots.
8. Field scale grazing plots.

Projects on which work will be started when possible are:—

1. Vlei drainage.
2. Types of stone weir construction.
3. Types of trickle flow channels for earth dams.
4. Work on lysimeters and evapotranspiration.
5. Experiments on control of runoff and erosion by grass strips.
6. Small scale experiments on raindrop effects on sand soils.
7. Development of auxiliary investigations.
8. Use of artificial rain-making machines (Type F. Infiltrometer).

The present staff of two junior Professional Officers and one African Technical Assistant (to be increased shortly to two) is not adequate for the above programme.

(b) *Grazing Areas*

(i) *General Management*

The views of many farmers and ranchers are changing to an appreciation of the serious need for proper veld utilization and management. There has been a marked increase in requests for assistance in the development of grazing programmes and management systems. I.C.A. Committees have been active in many areas to bring about pressure for the better use of the grazing land.

Where it has been possible for farmers and ranchers to apply a system of grazing control the results are evident and this form of practical and visual demonstration will aid the further application of sound methods of land use.

(ii) *Mechanical Protection*

The past few good seasons have done wonders to bring about recovery of eroded areas in the veld. The mechanical protection works in these areas have been mainly confined to gully control and ripping of bare spots and old roads. These works are valuable and although the worst sections have been dealt with, it is inevitable that further attention will be required for a long time.

(iii) *Veld Fires*

Veld fires have again been serious and widespread. The main trouble is in many instances the absence of whole-hearted co-operation and the lack of individual responsibility amongst farmers. It is, however, pleasing to report that there is a definite and active interest by most I.C.A. Committees to get this problem under control. In some areas the systems applied have been most successful and these principles will undoubtedly spread in the future. In one instance a Committee has made use of the provision in the Natural Resources Act, 1941, as amended, to levy a tax and this has been accepted by the landowners. With additional funds available, this Committee will undoubtedly set an example in this matter.

Most Committees now employ fire rangers and with a system of fire ward-masters there is certainly a definite improvement in these areas.

It can safely be stated that with the greater determination of Committees, the increased propaganda of the Natural Resources Board, and the better understanding of the position by landowners, there is bound to be a gradual improvement in the control of indiscriminate burning.

(iv) *Bush Encroachment*

This remains a major conservation problem and the only economical method of control through proper veld management using fire as a tool. Here and there this is being done on farms and ranches, but unfortunately most landowners are still awaiting some wonder chemical or something else that could be used economically and effectively. Research and field trials are being undertaken and it is sincerely hoped that improved methods and techniques may be found or developed to deal with this problem.

(v) *Established Pastures*

There is an ever-increasing interest in established pastures and the acreage under these in the Colony must be quite substantial at the present time. The value of these pastures is appreciated by the cattlemen as well as those mainly interested in crops, especially tobacco.

With the experience now being gained by practical farmers in the utilization of planted pastures and the place of the various grasses and mixtures in the farming system, further expansion can certainly be expected in the near future.

There has again been a big demand for planting material from the various I.C.A. grass nurseries and Research Stations, which is an indication of the trend of development in the Country. Many farmers have established their own nurseries and are also supplying their neighbours with planting material.

The interest in vlei utilization has also brought about an interest in suitable grasses and clovers for planting in these areas. Nile grass as well as Tanner and Paspalum, with or without clover, seem the most promising and popular.

(vi) *Fencing*

A great deal of additional fencing has been erected during the year, but it will still take many years before adequate paddocking will be available on most farms and ranches to ensure proper veld management.

In the lowveld areas the ranchers are using high strain steel wire in preference to barbed wire as it has been found more suitable for their conditions especially where game is still troublesome.

9. WATER CONSERVATION

(a) *Dams built under the guidance of the Department of Conservation and Extension*

There has been a decline this year again in the total number of dams built but the aggregate capacity of all dams constructed has risen. The average size of dams built has risen substantially. There have been fewer I.C.A. Committee owned units operating and fewer Government owned units.

Table "A" below shows an analysis of all dams built by regions. The rise in the average size of dam is due mainly to the increased interest in supplementary irrigation from dams and this trend can be expected to continue.

TABLE A

Region	Period	Number of Dams	Aggregate Capacity	Average Capacity per Dam
			Gallons	*Gallons*
Mashonaland	1952–53	134	909,000,000	6,770,000
	1953–54	172	976,000,000	5,680,000
	1954–55	138	975,140,000	7,066,000
Midlands	1952–53	132	462,610,000	3,500,000
	1953–54	113	648,000,000	5,730,000
	1954–55	101	388,670,000	3,848,000
Matabeleland	1952–53	137	556,850,000	4,070,000
	1953–54	193	911,600,000	4,720,000
	1954–55	137	649,680,000	4,820,000
Eastern	1952–53	62	329,000,000	5,300,000
	1953–54	57	56,000,000	1,000,000
	1954–55	34	149,460,000	4,395,882
TOTALS	1952–53	465	2,257,460,000	4,850,000
	1953–54	535	2,591,600,000	4,840,000
	1954–55	410	2,162,950,000	5,275,000

Table "B" shows an analysis of dams by methods of construction and reflects the decrease in I.C.A. Committee owned units and Government owned units.

TABLE B

Year	Farmers		I.C.A. Committee Units		Government Units		Total Number
	No.	*%*	*No.*	*%*	*No.*	*%*	
1952–53	126	27·0	208	45·0	131	28·0	465
1953–54	194	36·5	234	44·0	102	19·5	530
1954–55	149	36·0	167	41·0	94	23·0	410

A change in hiring charges for Government owned units was introduced during the year. This change took the form of consolidating all charges into a single charge of 106/- per hour for a Class C Tractor with whatever ancillary equipment was needed. The movement charge went up from £22 10s. 0d. to £27 10s. 0d. per move.

(b) *Catchment Schemes*

(i) *Ncema*

During the year all the outstanding and previously approved works were completed. In a few instances alterations or additions were necessary and if authorized will be carried out in due course. It can be stated that this year saw the completion of planned work in a whole catchment, which is now in excellent condition as a result of the work and the good seasons experienced in recent years.

(ii) *Umzingwane*

In view of a major storage dam to be constructed in this catchment by the Bulawayo Municipality, it became necessary to institute protection work during the year. Programmes of work were drawn up for the European as well as the Native areas and approval was given to proceed with works under sections 22 and 23 of the Natural Resources Act.

Although the works were somewhat delayed in the initial stages they are now well under way and should be completed as planned for this year.

(iii) *Cashel*

Good progress has been made with the work in this area and it is anticipated that all the approved work will be completed in the near future.

(iv) *Tanganda*

Work has been planned for certain protection works in this catchment but it has not been possible to commence with any of these works. It is, however, the intention to carry out some of the work during the present financial year. Work in this catchment is of importance in respect of the Sabi Development Scheme.

(v) *Boulsimipi*

The fencing of this area in the Chipinga commonage was completed and has already done good in keeping cattle off the area, but it is too early to judge the improvement effected in the vegetative cover.

(vi) *Inyamapamberi*

The work envisaged last year has as yet not been carried out as the required materials could not be made available earlier.

(vii) *Inyagadzi*

A survey of this area is to be made during the coming year in order to locate the main sources of erosion and determine the nature of the work necessary for control and prevention of further damage.

(viii) *Umfuli*

The Native Department continued with protection works in this area and the position in the Mondoro reserve is much improved.

The European farming area in this catchment is now well conserved and with proper land-use methods in the future there is little danger of silt entering the river to any extent.

(ix) *Umsweswe*

Reclamation work continued on old roads and tracks in the Sokis section of this catchment. In addition the Native Department carried out normal protection work in the native reserves concerned.

(x) *Sebakwe*

Work continued in this catchment and completion should be possible within the next few years. The effects of the work carried out to date are already evident. This is most encouraging to the landowners as well as the Department.

(xi) *Umniati*

The work in this catchment was completed during the year and now that most of the ranches have been allocated, control and protection will be undertaken by the new owners as in all other cases.

(xii) *Lundi*

Work in this catchment above the Gwenora Dam site has been planned and approved and is now under construction. It is expected that most of this work will be completed during this coming year.

(c) *Vleis and Sponges*

The past few good seasons have brought back many vleis and sponge areas. In some cases cultivation had to be curtailed due to excessive moisture. In most parts there has been an improvement in the protection of these areas. The proper use of our vleis is still a major problem and to this end research work has been instituted, but further concentration of effort is essential.

Some of the sponge areas protected in the Umvuma I.C.A. were badly damaged by fire during the year. The peat beds burnt for days on end and this is undoubtedly a serious set-back to the conservation of soil and water. These fires proved the necessity for the proper management of the vlei and sponge areas once they are protected by fencing.

(d) *Underground Water*

There has been a steady building up of underground water supplies as a result of the successive good seasons. In some parts of the Hartley district the water table came to the surface causing considerable damage to crops through water-logging. Wells, boreholes and springs maintained their supplies and no failures were reported.

10. SURVEY OF MECHANICAL UNITS

(i) *I.C.A. Units*

Despite the fact that several more I.C.A. Committees ceased operating their own equipment, those remaining in the field still built most of the dams. Out of a total of 410 dams built during the year these units built 157, farmers themselves built 149 and Government owned units built 94. It is thus clear, that notwithstanding their depleted numbers the I.C.A. Committee owned units are still performing a useful and important function in the conservation field. These units moreover continue to achieve a higher output of productive hours than do the Government units, as is shown in the table attached.

(ii) *Government Units*

The reduced number of Government owned units reported on last year has continued to function satisfactorily and the wisdom of this policy is reflected in a

greater efficiency of operation due largely to the steadier rate of working which has resulted from the reduction. The figure for productive hours rose last year from 102 hours per month to 112 hours per month and this year, despite a very long wet season, it has risen to 123 hours per month. (Productive hours including servicing time.) Time lost due to breakdowns continues to be excessively high though there is a substantial reduction from last year.

The attached table shows an analysis of the performance of Government and I.C.A. Committee units.

	Government Units			Intensive Conservation Area Committee Units		
	1952–53	1953–54	1954–55	1952–53	1953–54	1954–55
TOTAL HOURS— Average TRT hours possible per month	226	227	239	226	240	226
Percentages	100	100	100	100	100	100
PRODUCTIVE HOURS (including servicing) average per tractor per month	102	112·4	122·8	121	143	143·6
Percentages	45·9	49·5	51·2	53·8	59·6	63·5
Time spent moving per month	13·7	14·9	14·5	5·0	6·9	7·3
Percentages	6·1	6·6	6·0	2·2	2·8	3·3
Time lost due to breakdowns	39·9	45·2	38·1	30·0	32·8	21·5
Percentages	17·8	19·9	15·8	13·4	13·7	9·5
Time lost due to other causes	68·1	54·5	64·6	69·2	57·3	53·6
Percentages	30·2	24·0	27·0	30·6	23·9	23·7

(iii) *General*

The overall lower output of mechanical works is a natural consequence of the fact that during the past few years an immense volume of conservation works have been constructed and the tempo of construction had to slacken off once the backlog had been overaken. Coupled with this factor is the growing realization that soil conservation is more a matter of land-use practices than of mechancial works, though the latter will always have an important place in the scheme of things.

11. FIELD TRIALS

A large number of field trials were again organized in collaboration with the Department of Research and Specialist Services by field officers in co-operation with the farmers. These were mainly variety trials with crops such as maize, cotton, wheat, tobacco and others; fertilizer trials with various crops on different soil types on dryland as well as under irrigation; soil management trials including stubble mulching; horticultural trials with minor elements on fruit and vegetables as well as for the control of diseases and pests.

These trials are serving a most useful purpose in providing valuable information for ourselves and research workers and also act as demonstrations to the farmers. As a result, farming systems and practices have shown an improvement in many areas during recent years.

Some very useful and valuable information was obtained from the potato fertilizer and variety trials both on dryland and under irrigation.

During the coming year it is intended to commence with trials in respect of veld management in the lowveld areas.

12. ADVISORY SERVICES

(a) *General*

The policy of this Department to train and develop all conservation officers over a period of years to a stage where they can assist the Regional and Group officers with the general advisory work to farmers, is being pursued and it is pleasing to report that many of these officers are already rendering valuable services in their areas.

The advice of this Department is eagerly sought by farmers and is certainly valued in most cases. The officers who have been specially trained in tobacco are finding it impossible to meet the demands for their assistance during the tobacco season.

The programme of selecting a few officers for training on tobacco farms every year is being continued and it is anticipated that most of the officers stationed in the tobacco areas will eventually be trained in this manner. It is also intended to provide for the more intensive training of officers in respect of livestock management and to this end arrangements for assistance by the specialists have been made. Intensive short courses covering a variety of subjects are organized from time to time to assist and guide field officers in respect of these matters.

The following table reflects the number of visits carried out by officers in the course of their duties:—

VISITS RETURN

Meetings Attended	Eastern Region	Midlands	Matabele-land	Mashona-land	Total
1 I.C.A's. Group Committees	288	494	276	518	1,576
2 Farmers Associations	68	162	52	138	420
3 Road Council	76	38	14	75	203
4 Young Farmers' Clubs	53	21	61	60	195
5 Staff—Group and Regional	97	214	113	271	695
6 Miscellandous Meetings	218	177	91	225	711
7 Visits with Committees, and I.C.A. Business	369	153	217	394	1,133
INSPECTIONS					
1 Soil and Water Conservation Subsidy	65	80	83	294	522
2 Water Court	305	73	57	249	684
3 Sub-division	56	16	22	66	160
4 Timber Cutting	14	24	10	8	56
5 Livestock Improvement Scheme	64	112	158	190	524
6 Grazers	9	16	21	8	54
7 Dairy Bonus Scheme	49	38	9	50	146
8 Land Bank and Rehabilitation	—	6	4	24	34
9 Land Settlement Board	12	43	46	77	178
10 Crown Land	34	47	26	29	136
11 Grass Seed Association	7	9	1	45	62
12 Miscellaneous	1,134	633	312	1,123	3,204
ADVISORY					
1 Farm Planning	343	381	196	419	1,339
2 Extension	1,046	1,497	641	1,214	4,398
3 Conservation-advice-pegging	1,984	2,735	1,402	3,889	10,010
4 With Irrigation Engineers	125	64	168	306	663
5 Mechanical Units	280	323	499	992	2,094
6 Miscellaneous	732	337	436	1,096	2,601
7 Irrigation Layouts	238	164	193	163	758
8 Experimental Stations	192	92	94	225	603
9 Farmers' Days	97	118	65	202	482
10 Field Trials	—	427	—	—	427
11 Roads Department and Councils	—	85	—	—	85
12 Grass Nurseries	—	393	—	—	393
TOTAL					29,546

(b) *Farm Planning*

Excellent progress has been made with assistance to farmers in developing land-use plans for their farms. In most areas the procedure, aims and objects are now understood, but this cannot be stated to be the general position, consequently a lot of time is still taken up explaining the position to Committees and farmers.

The value of farm planning is undisputed and there is no doubt that this work will be speeded up as soon as a few plans are completed in each I.C.A., and farmers have had an opportunity of studying their application more carefully. In some areas the demand for help is already beyond the capacity of the local officers. At present work is being done on 204 properties.

(c) *Farmers' Days*

Farmers' or field days have now become part of the agricultural life of the community in many of the I.C.A.'s and are having a great effect on the raising of the standard of farming. In most areas one or more small field days are organized by Committees and the local officers and in many cases the farmers themselves now do the talking and explaining which is the ideal method of gaining the support and confidence of the other farmers in the area.

In some areas "Group" farmers' days are organized once a year and specialists are invited to deal with some specific problems. These larger field days are also valuable and fill a gap in the general organization of the advisory service.

Demonstrations are arranged in some areas in respect of specific problems such as the sowing of tobacco seed beds or dosing of cattle, and neighbours are generally invited to attend for an hour or so. These short demonstrations are most valuable and should receive more attention.

(d) *Shows*

Agricultural shows were held at all the usual centres and without exception were better than the previous year. Officers of this Department officiated as judges at most of the shows and also assisted as stewards at the major shows.

A Ministry exhibit was organized by a show Committee representing the various Departments and this was a vast improvement over previous years. The main theme this year was "water utilization". Officers of this Department were mainly responsible for the staging of the exhibit.

At Umtali a model farm plan lay-out was arranged on the section of land used by this Department for its exhibit. This actual lay-out proved popular and led to a vast number of enquiries for assistance in farm planning.

(e) *Farmers' Associations*

Closer co-operation between the I.C.A. Committees and Farmers' Associations is gradually developing and in some areas farmers' days are arranged jointly. This is a move in the right direction and can only lead to the improvement of agriculture generally.

Officers of the Department attend meetings of Associations wherever possible and also deliver talks on specific problems.

(f) *Teachers' Course*

Conservation short courses were organized for teachers at Salisbury and and Umtali with great success during the year. The number of applications is gradually increasing and the teachers who have attended are most definite about the value of the courses, in fact, at Umtali, some teachers attended for the second time.

In order to cover the programme of assistance to the teachers, further courses will be arranged during the coming year, and probably also in N. Rhodesia.

With the establishment of a teachers' training college at Bulawayo, it is opportune to include resource use education in the curriculum and it is sincerely hoped that this will receive the consideration of the Education Department.

(g) *Young Farmers' Clubs*

The movement had a good year and most of the objects were achieved and progress made. The National Council met twice and crystallized its policy. It is however disappointing that the Education Department has as yet not nominated a representative on the Council.

During the year the first Annual General Meeting was held at Norton during May to coincide with the National Camp. It was decided at this meeting that the movement should be unfrozen, and also to encourage clubs for coloureds and Africans in separate sections, but united by a common Council.

The appeal for funds by the Council was gratifying and over £2,000 was received which proves the growing public support for the movement.

This year also marked the exchange of members in that two members from the U.K. visited Rhodesia and two from here made a visit to the U.K. This is most valuable and will no doubt be extended in the future.

The standard of work of the clubs has shown a general improvement and record entries for projects were received. The exhibits and activities at the shows were of a high standard and it is quite evident that the clubs are finding their feet in this respect.

Land has been made available for the clubs at the showgrounds of Salisbury, Bulawayo and Umtali and these plots can now be developed for permanent use in the future.

The main problem during the year was staff. The one Organizer just could not cope with the work, especially in view of the demand from numerous centres for the formation of clubs. It is hoped that another full-time Organizer will be made available during the coming year.

Three additional clubs were declared during the year bringing the total to 23, with a membership of 706.

(h) *Agricultural Engineering*

With the limited staff available to assist farmers with their problems of equipment, buildings and lay-outs it is not possible to cope with the work satisfactorily. This is a branch of the advisory service that requires strengthening as vast amounts are invested by farmers in machinery and equipment annually and very little guidance can be given for its proper use.

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Some progress was made in improving and adapting various machines and equipment for silage harvesting as well as for maize harvesting. In addition work is proceeding on various other types of equipment to facilitate farm operations.

The building programme of the Department continued satisfactorily and several houses were erected for officers in outlying parts. Assistance and guidance were also provided for farmers in respect of building operations.

13. DEMONSTRATION FARMS

(a) *Chipinga Demonstration Farm*

A total of 61 inches of rain was recorded on the farm during the year. Of this total 18½ inches fell during December which adversely affected the crops. In spite of this very wet season the grain and fodder crops were reasonable and adequate for the requirements of the farm and stock.

The installation of an overhead spray irrigation system has been most useful to keep the grass-clover pastures in good growth and production. Additional pastures were planted and it is hoped to have adequate good grazing available for the dairy herd in the near future.

The farmers in the area and even from other areas in the Eastern Districts are visiting the farm. There is no doubt that the farm is serving a valuable purpose and is appreciated by the farming community.

A complete land-use plan is now in preparation and as soon as this is approved it will be implemented and should lead to further guidance and a demonstration to farmers in farm planning and development.

(b) *Karoi Demonstration Farm*

A total of 44 inches of rain was recorded on the farm and during certain periods conditions were extremely wet and hampered operations. Crops on the whole were good, except for heavy infestation of cutworm on the land pastured and mucked the previous season.

Additional acreages of Rhodes grass pasture were established and in future this grass will be used in the rotation instead of Napier. Some excellent grazing was available from Napier during autumn and early spring and this grass will be used in separate blocks for this purpose.

The livestock has done well and the dairy herd will be culled shortly to dispose of surplus stock. A beef herd of grade Africander cattle will be introduced during the coming year to add to the demonstration value of the farm.

Dryland lucerne continued to do well and further planting will be undertaken. This crop can certainly play an important part in the pastures of this country.

The sheep have done well and there is a steady demand for rams and breeding stock.

The pig section is now well established and should be in full production during the coming year.

Excellent co-operation was obtained from the I.C.A. Committees in respect of the operations on the farm and the planning of the programme. A complete land-use plan is now being completed and will be brought into operation soon.

A successful farmers' day was held and farmers from the area are regular visitors to the farm and discuss problems with the officers concerned.

(c) *Whole Farm Demonstrations*

Good progress can be reported in connection with the whole farm co-operative demonstration scheme, in that the first applications were received and considered by a Committee set up to guide and control the project. Eight applications have been approved and accepted and these farms will now be planned with the owners and the scheme implemented in progressive stages. It is anticipated that further suitable applications will come in for consideration by the Committee and that eventually there will be at least one of these farms in each I.C.A.

14. S.A.R.C.C.U.S.

The next meeting of S.A.R.C.C.U.S. is due to be held in Swaziland during November, 1955. Delegates from this Department will attend the meeting. Reports on the various matters raised at previous meetings have been prepared and submitted for consideration at the next meeting.

There is no doubt that this organization is proving most valuable to the member countries and the exchange of information is assisting in the development of agriculture and proper land-use.

15. CONCLUSION

In spite of some problems and difficulties it can be stated that there has been considerable advancement in farming during the year. Several new programmes such as farm planning and the whole farm demonstration scheme have been launched with good results.

The general interest in better land-use methods, especially soil, crop, and livestock management, is most encouraging and must lead to a more stabilized and profitable agriculture in the future.

I wish to conclude with my sincere appreciation to all members of my staff for their loyal support and devotion to duty during the year. I also received full assistance and guidance from the Natural Resources Board, the I.C.A. Committees, the Rhodesia National Farmers' Union, the Rhodesia Tobacco Association, the Tobacco Research Board, and other Departments and this has made it possible to proceed on sound and proved lines in the development and use of the land.

C. A. MURRAY,
Director of Conservation and Extension.

REPORT OF THE DIRECTOR OF VETERINARY SERVICES FOR THE YEAR ENDING 30th SEPTEMBER, 1955

Staff

The retirement of the Director, Mr. J. S. Adamson, in December, and the failure to fill his post owing to the uncertainty as to whether veterinary services in Northern Rhodesia would become a Federal responsibility left the professional staff at one under strength for nearly ten months. As the Assistant Director (Research) was transferred to act as Director and his place in the Research branch was not filled this shortage was reflected in the Research branch.

The operations of private practitioners, either as such or under the Government assisted animal health scheme, has not materially reduced the pressure of work on official staff. On the contrary, in the case of the Research branch, these have actually led to increased material coming forward for more detailed examination and in the case of the Field branch, have necessitated more field investigations into diseases or conditions encountered by these practitioners.

Lay staff in the Department always presents a problem — it is difficult to maintain the inspectorate staff at efficient "trained" strength and it is most disappointing to find the young, keen man of real promise leaving for more remunerative and congenial occupations after being partly trained; like many others the Department has also suffered from lack of clerical staff.

Despite the above difficulties, it is pleasing to record that through the willing co-operation and hard work of the staff the general satisfactory control of disease has been maintained and that no serious untoward consequences have resulted. More than this, however, is required to put the animal industry on a sound and flourishing basis. Professional staff, assisted by the lay staff must be available to attend to all the many factors such as low fertility, slow development, losses from preventable diseases and poverty which at present are responsible for the unsatisfactory state of the cattle industry in what should be a more than self-supporting country.

Tick-borne Diseases

East Coast Fever is probably the first disease thought of under the above heading and its importance should never be minimized. It is pleasing to record that no further case has been disclosed, in spite of the continued intensive vigilance in the old haunts of infection, since the herd infected in March last year was slaughtered. Continued vigilance and control of the tick population is essential if this very satisfactory position is to be maintained. It is, however, distressing to realize the vast annual toll that other, less spectacular, tick-borne diseases still take of our cattle, in spite of the mass of information available and advice constantly given about comparatively simple and practical methods of prevention. It might be argued that the Department's responsibility should end with telling and showing the farmer what to do to control ticks, and during recent years, when the inspectorate staff has been hard pressed to keep pace with rabies vaccinations, B.W.D. testing, smearing and treating cattle for trypanosomiasis etc. this is almost what has been happening in practice. We cannot, however, at this time of beef shortages rest content to see a farmer's cattle die from tick transmitted diseases, adopting the attitude that as it is his own fault let him pay the penalty. It is our responsibility to such farmers neighbours and to the industry as a whole to see that this does not happen. Many of our old inspectorate staff still regard themselves primarily as "tick-busters" whose main duty was not only to advise farmers to keep their cattle clean but to see that they did so. Regrettably, this function of inspectors has gradually fallen away with the result that to-day our losses from tick borne diseases are probably as high as they have ever been, albeit not in as spectacular a manner.

With the introduction in recent years of very efficient synthetic tick destroying agents which have the added advantage of being almost non-toxic there should have been a very marked improvement in tick control. This however, has not been the case and some deterioration in the tick position can almost certainly be attributed to these very insecticides because of their improper use. These insecticides unfortunately undergo fairly rapid deterioration in dip tanks with resulting loss of biological efficiency. Freshly made up they are excellent but their use in a freshly made up state is out of the question in dip tanks and it is completely uneconomic to discard several thousand gallons of dip wash at short intervals. For this reason control of ticks by these insecticides through power operated spray races has been encouraged, but the warning is invariably given that unless the operation of the spray race is intelligently supervised to ensure efficiency every time it is used control will not be achieved. For several years past commercial spray race manufacturers have been encouraged to develop their races to greater efficiency and greater simplicity of operation and a constant watch has been kept on progress and improvements achieved in these directions. Encouragement has also been given and suggestions made concerning develop-

ment of a portable spray race. One such has very recently appeared on the market and shows promise of being of real value for ranching conditions, and its structure is such that modifications to suit local needs can be readily and easily effected.

Rift Valley Fever

Prior to the summer of 1950/51, when this disease first made its appearance in the Union of South Africa, it was merely of academic interest to us as a virus disease affecting cattle and sheep in Kenya, where it had first been identified in 1931.

From the time of its first occurrence in the Union until the middle of 1955, it excited little interest here although evidence of the presence of the virus in the Umtali district had been recorded in 1952.

In 1955, a serious incidence of abortion in cattle was reported from the Nyamandhlovu area. Initially the farmers had enlisted the aid of private veterinary practitioners and ergot or similar fungus parasitised pastures were incriminated. When the aid of the Department was sought there was abundant evidence that the grazing had been very heavily infested with various fungi, and as other common causes of abortion, such as C.A., trichomoniasis and vibriosis, were excluded by laboratory tests it was concluded that these fungi were responsible. By that time, however, sufficient quantities of infested grasses could no longer be collected for feeding trials. Furthermore, inquiries from overseas failed to elicit any evidence in support of the popular conception that ergotized grasses played any part in the causation of abortion in cattle. It was therefore decided to submit serum samples from cows that had aborted to Onderstepoort, the serum neutralization tests with R.V.F. virus. These tests revealed a very high percentage of infection, not only with true R.V.F. virus but also with another similar virus which had recently been isolated in the Union and to which the name Wesselsbron virus has been given. Surveys to determine the extent of infection are still in progress and we are very indebted to the Director of Veterinary Services, Onderstepoort, for undertaking the tests in this connection.

A vaccine against R.V.F., but not against Wesselsbron virus, had been developed at Onderstepoort to combat the disease in cattle and sheep, the latter species having suffered very heavy mortality during the earlier outbreaks in the Union. Supplies of this vaccine have been imported and used in the infected area, but it is too early yet to assess the results.

Trypanosomiasis

As pointed out by the Assistant Director of Veterinary Services (Field) in his detailed district by district report, there has been improvement in the trypanosomiasis position in certain areas but quite marked deterioration in others. The general picture is a depressing one, which leaves no room for complacency. This Department's main responsibility lies in the diagnosis and treatment of the disease. Eight Animal Health Inspectors have been withdrawn from their normal duties to deal solely with this. Three Government Veterinary Officers also are primarily engaged on trypanosomiasis control. Other Animal Health Inspectors and Veterinary Officers are employed on trypanosomiasis duties, temporarily in a full time capacity, and for the rest of the time dealing with the problem as part of their ordinary functions in connection with prevention of scheduled diseases.

Although diagnosis and treatment, as stated above, represent our main responsibility, the preventive aspect also engages our attention, either in a general manner through the Trypanosomiasis Committee or specifically by attempting with the aid of fences and patrol guards to keep cattle away from known tsetse fly.

Treatment with Dimidium bromide is still the usual method followed, but a large scale trial with Antrycide Prosalt is being undertaken in the Sabi Division where over 17,000 head of cattle are threatened. Regular short interval treatment of this large number of stock with dimidium bromide given by the intravenous route is not practicable — too many staff would have to be taken off other duties and repeated intravenous injections might lead to trouble either in the way of damaged veins or liver degeneration. The plan is to treat every animal every two months with a subcutaneous injection of Antrycide Prosalt in the expectation that sufficient concentration of the drug will persist to act as an efficient chemo prophylactic in preventing infection. The reason why Antrycide has not been used previously in fly areas was on account of the danger of drug fast strains of trypanosomes becoming established. With regular bi-monthly treatments it is believed that this danger will be minimal and that it will be possible to prevent the disease from assuming serious proportions while steps are being taken to control the tsetse fly.

Rabies

Some progress in the control of rabies appears to have been achieved. Eighty-three less cases were confirmed than in the previous year and of these nineteen were in species of animals on which preventive vaccination is not practised, viz: 12 jackals, 1 cat, 4 cattle, 1 pig and 1 human. This fact and the fact that of the 81 cases in dogs all but 9 were in non-vaccinated dogs indicates that the continued policy of vaccination is fully justified. Vaccination alone, however, has proved to be insufficient for full control and eventual elimination of this disease. It can only be regarded as an aid, and is undoubtedly a very valuable aid to other methods such as quarantine, destruction of ownerless strays, confinement etc. It has been most noticeable in this country that, in areas where repeated cases of rabies have occurred despite every attempt to secure public co-operation in effecting full vaccination cover, best results have followed vaccination together with tie-up of all dogs and ruthless destruction of all loose dogs. It is, however, not enough merely to "order" such tie up and vaccination or re-vaccination, it is essential to ensure that such orders are carried out. For this purpose men are engaged as canine destruction officers, and where they have operated the long drawn out, smouldering infection has been rapidly overcome. It is, however, very difficult to get suitable men to fill these posts, the very nature of their duties being abhorrent to most.

The Department is doing its utmost to eradicate rabies, but the success of the campaign is so largely dependent on the full co-operation of the public that unless this is forthcoming we can expect to have this scourge with us for many more years.

The Acting Director and the Acting Assistant Director (Research) were fortunate in being able to meet and have discussions with the leading world authorities on rabies while attending a special rabies training course and seminar organized jointly by W.H.O. and C.C.T.A. in Nairobi. The above officers were able not only to gain valuable information but also to contribute much in the light of the extensive experience of vaccination against rabies in Southern Rhodesia.

Conferences

Apart from the rabies course mentioned above, representatives attended meetings of the Inter-territorial Foot and Mouth Disease Committee held in Pretoria. The Council of Management of the Interafrican Bureau of Epizootic diseases, and the Advisory Committee on Epizootic Diseases in Nairobi and the Jubilee Congress of the South African Veterinary Medical Association held in Pretoria. Such conferences are in themselves of great value but the contacts made and the informal discussions and exchange of views outside the Conference hall are of even greater value.

The full reports of the Field and Research branches follow.

D. A. LAWRENCE,
Acting Director of Veterinary Services.

REPORT OF THE ASSISTANT DIRECTOR OF VETERINARY SERVICES (FIELD) FOR THE YEAR ENDING 30th SEPTEMBER, 1955

STAFF

Assistant Director of Veterinary Services (Field:—Mr. J. MacKinnon.

District Veterinary Officers:—

Bulawayo	Mr. J. W. Nixon.
Salisbury	Mr. T. L. May.
Fort Victoria	Mr. J. M. Williamson.
Gwelo	Mr. A. MacGilp.
Umtali	Mr. H. K. Hesketh.
Melsetter	Mr. H. M. Hodkin.

Senior Veterinary Surgeons:—Messrs. R. W. Bryson, A. E. Gillespie, A. D. Hurrell, J. E. Robinson, J. Ross.

Government Veterinary Surgeons:—Messrs. J. D. Adamson, W. P. Boyt, V. A. D. Browne, E. Cock, P. J. Hannan, J. L. McCulloch, W. A. Mundy, H. R. Thorogood, A. Wilson.

The approved Field establishment is 22 officers. There is, however, one post not filled.

Mr. J. S. Adamson, the Director of Veterinary Services, retired on superannuation in December, 1954.

New Appointments:—Nil. Resignations:—Nil.

Animal Health Inspectors

The approved establishment is 68 and the year began with a shortfall of one and ended with a shortfall of three.

During the year new appointments were nine, resignations seven, discharges two, and superannuations two.

The annual wastage as shown above does not lead to efficiency but has to be accepted as a usual occurrence. Many of the more promising recruits are lured away mostly to farming where prospects are better and conditions more congenial. It is very disheartening to spend a considerable amount of time training these men and then have them walking out just when they are becoming useful.

Meat Inspectors

The department undertakes the inspection of meat at the Cold Storage Commission abattoirs at Bulawayo, Fort Victoria, Umtali and Salisbury, and also at Liebigs Factory, West Nicholson.

For this purpose the approved establishment is fifteen qualified Meat Inspectors. The year began with thirteen men and two appointments were made during the year. Of these, one resigned, leaving a shortfall now of one.

Although numerous inquiries were received, following upon an advertisement, no applications for the vacancy were made.

Clerical Staff

Here again the department has been at a disadvantage. The authorized establishment is six male and five female clerks and two typists. During the major portion of the year only one of the three male clerks employed was on the permanent staff, the other two being employed in a temporary capacity.

Accommodation

Little progress in this respect can be reported as no offices or quarters were erected. However, it is pleasing to record that the long awaited quarantine station at Plumtree was commenced and it is hoped that it will be in operation during 1956.

In view of the lack of quarters, particularly on outstations, difficulty was experienced in transferring suitable officers where their services were most needed. For instance, on Trypanosomiasis duties, officers are housed in aluminium or galvanized iron units of the Kaytor hut type. It will therefore be appreciated that only bachelors can be employed in this sphere.

Transport

A distinct improvement is recorded in this respect. The improvement was due entirely to the fact that all field officers were encouraged to use their private vehicles on Government duties. Loans up to a maximum of £850 were made available to officers to purchase suitable vehicles.

Almost all officers possess private vehicles but for economic reasons these are

in the low horse-power class and unsuitable for official use. The decision in 1953 only to approve the use of vehicles of 16 or more H.P. was a wise one.

By the end of the year thirteen professional and thirty-one lay officers were using their private vehicles on Government duties whereas only five professional and two lay officers did so during the previous year. During the year under review a total of 333 man days (professional officers 5, Animal Health Inspectors 328) were lost in comparison with the previous year's total of 1,115 man days.

This improvement in the transport position had a beneficial effect on disease control.

Although the department was handicapped by the number of personnel on long (vacational) leave it was found unnecessary to apply for the exemption of any officer from Military training.

GENERAL

Rainfall

General rain set in early and by mid December communications were cut. Almost all districts reported record falls. Rains continued into May and until then the countryside was sodden. Travelling off the main roads during this period was very difficult and in many cases impossible, because of the damaged roads and the impassable rivers. It will be appreciated that inspections in the outlying districts were greatly interfered with by these prevailing conditions.

Water supplies were good throughout the year, surface water being plentiful and dams filled to capacity. It was reported that a number of dams gave way under the pressure of water.

Grazing

An early and extremely rank growth of grass with early seeding occurred, resulting in a correspondingly heavy drop in feed value.

Spraying of veld grass with urea and molasses was tried by many stock owners, with fair results. As may well be imagined, owing to the rank growth, fires did extensive damage and very large tracts were completely burnt out. However, owing to the moisture in the soil green grass was soon in appreciable evidence. Very little hay was well made. Much bad coarse hay was garnered and only made palatable to stock by the addition of urea and molasses. Cowpeas and beans went mouldy before reaping. In a number of cases crops were ploughed back into the soil.

It is pleasing to record the interest now taken in irrigated pastures. Permanent pastures of Bambatsi panicum and Katambora rhodes have given excellent yields.

Condition of Cattle

Losses from poverty were light at the beginning of the year, the heaviest occurring in the Lupane area. Early in the year cattle quickly improved in condition, but they did not fatten as expected, the excessive wet weather having an adverse effect. From April onwards cattle throve and maintained condition throughout the year. Exceptions were recorded, however, in overstocked Native Reserves and on mismanaged farms. It is evident that weaners on many properties are carrying a heavy burden of internal parasites and that little is being done to improve the position. This was an exceptionally bad year for sheep and throughout losses have been heavy, due entirely to internal parasites. Goats in the drier areas have done well.

Tick Life

With continued rain and flooded dip tanks, at the flush season little control could be effected, the result being that pastures became tick infested. However, when the opportunity arose the progressive stock owner soon remedied the position, but the less interested owner soon found himself in trouble. Owing to outbreaks of disease it is recorded once again that inspections under the Cattle Cleansing Act were only maintained at a low level.

Regular inspections in themselves will not solve the problem and can only minimize the attendant risks. The less progressive stock owner is inclined to look upon ticks as a nuisance, not as a menace, with the result that his efforts at control are seldom enthusiastic.

It is sad to report that the worst offender in this respect is the European farmer. Considering the amount of literature on tick control passed to him by the salesmen of companies concerned and the Department's propaganda, which leads to a better understanding of the problem, he still procrastinates until either an official inspection reveals his shortcomings or the herd is reduced through tick-borne diseases.

Over the last few years it was fashionable to decry arsenical dips, organic insecticides being the popular choice. However, during the year under review, there has been a definite swing back to arsenical dips, preparations such as D.D.T. and B.H.C. and Toxaphene being now used as adjuncts to arsenic washes during the flush season. It is also reported that spray races, particularly in Matabeleland, are no longer popular and that a return to the dip tank is evident. The main reason for this is that it has become evident that the spray race demands European supervision whereas the dip tank does not. The dairy farmer, on the other hand, finds the spray race the answer to his problem and a more intelligent switching of selective insecticides is now apparent.

The department is very anxious to ensure that spraying will succeed and is carefully watching and advising on improvements.

Quarantine Notices

Bulawayo 304, Salisbury 192, Fort Victoria 70, Gwelo 111, Melsetter 64. Total 775, which is 22 more than in the previous year.

Contraventions

Cattle Cleansing Act: Bulawayo 334, Salisbury 40, Fort Victoria 646, Gwelo 3, Umtali 18, Melsetter 47. Total 1,088.

Animals Disease Act: Bulawayo 227, Salisbury 448, Fort Victoria 67, Gwelo 35, Umtali 253, Melsetter 54. Total 1,084.

SCHEDULED DISEASES

African Coast Fever

The last outbreak of this disease occurred on the 10th March, 1954, on Reitvlei Farm in the Chipinga Native District. The cattle involved were slaughtered and the owner compensated. The infected farm, still without stock, is cordoned off.

Intensive supervision in the Chipinga and Melsetter Native Districts continued throughout the year. There were no further developments to record.

Theileriosis

Outbreaks of this disease were confirmed as follows:—

Bulawayo	...	2	outbreaks	...	600	deaths	approx.
Salisbury	...	8	„	...	142	„	„
Fort Victoria	...	5	„	...	81	„	„
Gwelo ...	...	1	„	...	1	„	„
Umtali ...	...	11	„	...	53	„	„
Melsetter	...	2	„	...	8	„	„

Total 29 outbreaks resulting in a mortality of 885 head.

The incidence of the disease decreased during the year but the mortality rate was high, particularly where the better bred animals were involved.

Various new drugs were tried out but none has proved to be specific against the casual parasite which has now been named Th. lawrencei in honour of Mr. D. A. Lawrence who first recorded it as a specific and not previously indentified species.

On confirmation of an outbreak the farm is quarantined and short interval dipping and hand-dressing enforced. Three months after the last case the quarantine restrictions are removed. It would appear that the recovered animal is a carrier which when sold to an indifferent dipper, will soon set up another focus of infection. Two stock owners who have had recurrent outbreaks slaughtered all their cattle and in course of time intend restocking. It is the policy now, whenever tick activity is noted on old centres of infection, immediately to commence short interval dipping in the hope of controlling the disease in the early stages.

It will be appreciated of course that this practice takes up a considerable amount of time and personnel.

Anthrax

Bulawayo: No outbreaks were recorded but 16,610 head were inoculated with Anthrax vaccine.

Salisbury: Three outbreaks were confirmed with a mortality of 40 head. In all 41,209 head were inoculated as a precautionary measure.

Fort Victoria: No outbreaks but 18,340 head were inoculated.

Gwelo: Two outbreaks with a loss of 3 head. In all 3,404 head inoculated.

Umtali: No outbreaks but 676 head inoculated.

Melsetter: One outbreak with one death; 2,231 head inoculated.

Total outbreaks	... ...	6
Total Anthrax inoculations	...	83,470

It is reported that the vaccine caused, at one centre, 7% abortion in goats.

Foot and Mouth Disease

Three distinct outbreaks occurred. All three outbreaks were typed as S.A.T. 2.

The first outbreak took place on Angus Ranch in the Bikita Native District and was confirmed on the 31st March, 1955. Due to the prompt action on the part of the official in that area, the outbreak was confined to this ranch. The cattle were quickly inoculated, reactions were good and the outbreak was stamped out. It is interesting to record that the cattle on this ranch have been subjected to the following viruses:—

1952	...	...	...	S.A.T. 2.
1953	...	...	...	S.A.T. 1.
1954	...	...	...	S.A.T. 3.
1955	...	...	...	S.A.T. 2.

The second outbreak was detected on the 11th May, 1955, amongst recently introduced cattle on Westdale Ranch in the Chilimanzi Native District. The cattle had trekked from the Gutu Native Reserve. Infection was traced to the Chinyika Sale in Gutu Reserve, which had been held on the 29th April. In spite of the trek to Westdale, by the 16th May only 8 cases amongst some 2,000 head could be detected. From the Gutu Native Reserve an extension into the Buhera Reserve occurred. Two extensions from Westdale were recorded these being to Annandale A & B and Sans Jose.

The third outbreak occurred at Fair Range Ranch in the Ndanga Native District. An attempt was made to confine the outbreak to the Ranch but infection spread to other ranches and a decision was taken to inoculate all the cattle on the Ndanga ranches with the exception of those on Lone Star Ranch. The inoculations were completed by the 22nd June and no extensions resulted from this block inoculation.

Little trouble was experienced in recruiting Natives for cordon duties. At the end of the year the only actively infected centre was in the Buhera Native Reserve. Here, difficulty was experienced in making suitable cattle-free zones and also the local Natives gave a considerable amount of trouble and the control measures were accordingly slowed up.

When the year ended a double cordon was still in position in the Buhera Native Reserve.

A total of 105,519 head of cattel were inoculated with field virus during these three outbreaks. Reactions to the field virus inoculations in these outbreaks differed. In the Angus outbreak lesions were very mild and no slippering was evident. In the Westdale outbreak reactions were delayed and again of a mild nature. In the Fair Range outbreak, however, lesions were classical and very severe. On one ranch over 40 head, mostly calves, succumbed.

The question now arises as to where this infection originated. The virus S.A.T. II was last confirmed in the territory during 1953, in a very small pocket. Infection could not have simmered in cattle all that time and further some of the herds involved in this outbreak had been infected with a different virus in the interval. The only answer is that the disease simmered in game. The lower end of the Bikita and Ndanga Native Districts is subject to large migrations of game and therefore the cattle-game contact keeps the vicious circle of infection going.

TRYPANOSOMIASIS

Once again a high priority was given to the detection, treatment and control of this disease. The overall picture is a depressing one. Gains have been made in some directions but such have been offset by a rapid deterioration elsewhere. A very realistic outlook was adopted. The Trypanosomiasis Committee reviewed the general position thoroughly and submitted its recommendations to Government.

Following upon the recommendations of the Trypanosomiasis Committee a Commission of Inquiry into Animal and Human Trypanosomiasis was set up under the Chairmanship of Sir Eric Thomas with two leading authorities, Professor Davey and Mr. Potts. This Commission went into the whole question and their report is awaited with great interest, not only by ourselves but also by other departments, organizations, neighbouring territories and the general public. The disease position in the various infected districts is given hereunder;

Urungwe Native District

At the close of the last agricultural year aerial spraying was in progress in the Urungwe Native District. The spraying continued until mid November, having gradually faded out owing to accidents to aircraft and personnel. The area to be sprayed was eventually reduced to a very small acreage. It cannot be claimed that the spraying operations were a success.

Only one positive case of Animal Trypanosomiasis was confirmed on the Karoi Soldier Settlement block. The number of cattle on the infected farms dropped to 1,537 from an original figure of 3,341 when the disease was first confirmed. Of the original number of 28 farms infected only 21 now carry cattle. In view of the improved position regarding the disease it is not understood why the cattle population has dropped in this manner, particularly when it is realized that the confirmed mortality since the outbreak occurred has only been 28 head.

In the Urungwe Native Reserve small stock flourish without any mortality or clinical evidence of nagana, a total of 832 goats, 173 sheep and 111 pigs being carried, compared with 793 goats, 109 sheep and 134 pigs in 1953/54. In view of the fact that there are no cattle in the reserve and that the small stock are the only source of protein for the inhabitants, these figures are an encouraging portent as to the survival of small stock in the reserve.

The happy position reflected above did not extend to the donkey population, out of a total of 214 donkeys 74 succumbed to infection by T. brucei. Two bait oxen which were in constant contact with the infected donkeys failed to contract the disease. The overall picture here is considered satisfactory.

Mtoko Native District

In the Mtoko Native Reserve there are in all 6 infected dipping centres. During the year infection reappeared at one centre only, there being a total of 10 cases confirmed. The general position can be considered satisfactory.

In the Chikwizo Native Reserve the cattle population dropped from 304 the previous year to 249 at the end of this year. A total of 53 cases was confirmed, with a mortality of 38 animals. A number of cattle were also sold but the figures are not available. The original number of cattle held in the reserve when infection first appeared was 1,947. From the foregoing it will be realized that the disease position has not materially worsened over the year. It was possible during the year, owing to the reduction in numbers, to contain the cattle within the reserve and prevent the movement of stock to the Crownlands in the north.

A total of 740 inoculations was performed in the Mtoko Native District.

Mrewa Native District

In the Fungwe Native Reserve, where infection was found in May, 1954, the general position deteriorated markedly. In all 254 cases were confirmed, with a mortality of 68. Altogether 4,118 head of cattle were treated.

In connection with the Mtoko and Mrewa districts a fencing programme was decided upon during 1954. In the first instance a game fence running north approximately parallel with the international boundary from the Ruenya to Mazoe River is under construction. A cattle fence running from Jetu Hill on the south-eastern beacon of the Mtoko Reserve along the eastern and northern boundaries of the reserve through the Fungwe Reserve to the Mazoe River is also under construction. Both fences should be completed in the near future.

The erection of the fences was very much delayed, firstly due to strikes which affected the dispatch of the wire and secondly due to the tenderers failing to supply the standards and droppers.

Darwin Native District

Uneasiness was felt regarding cattle in the Chimanda Native Reserve and Rukori Native Purchase Area. However, continued inspections failed to reveal the presence of disease.

Sebungwe Native District

The position in this district deteriorated during the year, in all there are now 13 infected centres. A total of 160 cases were confirmed, being 94 more than in the previous year. A total of 3,569 head was inoculated with dimidium bromide.

Here again a fencing programme was decided upon, a cattle fence to run from the eastern end of Area "C" along the centre road to Area "E". So far only 10 miles of the fence have been completed.

Lupane Native District

A total of 10 cases were confirmed at Sibombo and Japiwa and 273 head of cattle were treated. This is a pronounced deterioration in comparison with the previous year.

Wankie Native District

The position here is static. Nine cases of Trypanosomiasis were confirmed and 2,003 head of cattle were treated.

Inyanga Native District

In the Inyanga North Native Reserve a total of 43 cases were confirmed and one further centre of infection was detected. In all 784 head of cattle were inoculated.

Umtali Native District

Trypanosomiasis was detected in a pig on a farm on the Portuguese East Africa/Southern Rhodesia border. Apparently 7 pigs had died before the matter was reported to the department. All pigs on the property were inoculated and no further cases developed.

Melsetter Native District

Infection was detected in one animal on a European farm and in six in the Ngorima Native Reserve. 114 head were inoculated.

Chipinga Native District

A very definite deterioration is recorded from this district. On 23 infected European farms 67 positives were confirmed and further, the disease appeared in the Musikuwanu Native Reserve, five dipping centres becoming infected. In the Native area 157 cases were confirmed and it is suspected that 737 deaths occurred. During July block inoculation of all cattle in the Native area was undertaken, 18,357 head being treated for the year. The general position has an explosive aspect. The cattle are positioned from the Sabi River eastwards to the international boundary.

G. morsitans is to be found east of the cattle and G. pallidipes to the south-east. It is obvious that a steady encroachment of tsetse towards the west is in progress.

Ndanga Native District

In the Ndanga East Native Reserve, which is west of the Sabi River, a total of 8 cases was confirmed. All cattle in the reserve, 4,216 head, were block inoculated and no further cases have been detected since inoculation. A number of G. morsitans and an odd G. pallidipes were taken in the southern corner of the district.

The position here, on account of its proximity to the infected cattle to the east, leaves little room for complacency.

Bikita Native District

For the first time infection was detected in the Sangwe Native Reserve. One case occurred here and five on a ranch north of the reserve on the Sabi River. It is believed that infection was picked up through contact with cattle on the east of the Sabi River.

With the exception of the Urungwe and Mtoko Native Districts the general position is very unsatisfactory. From the foregoing figures it will be noted that emphasis is placed on chemotherapy and yet it has been proved that despite chemotherapy large numbers of cattle cannot be kept in the presence of tsetse, particularly if the latter are present in numbers.

A total of 52,369 blood smears were taken and examined for Trypanosomiasis.

Rabies

The following cases were confirmed during the year:—

Native District	*Number of Cases*	*Date of Last Case*	*Species*	
Belingwe	2	3.7.55	2 dogs	N.V.
Bikita	2	4.2.55	2 dogs	N.V.
Bubi	1	10.1.55	1 dog	Vac.
Buhera	1	4.2.55	1 dog	N.V.
Bulalima Mangwe	2	2·2·55	2 dogs	N.V.
Bulawayo	2	25.11.54	2 dogs	Vac.
Charter	3	10.8.55	2 dogs 1 cat	N.V.
Chibi	nil	—	—	
Chilimanzi	nil	—	—	
Chipinga	4	26.12.54	4 dogs	N.V.
Darwin	nil	—	—	
Goromonzi	1	28.4.55	1 dog	Vac.
Gutu	1	14.10.54	1 dog	N.V.
Gwanda	4	26·5·55	4 dogs	N.V.
Gwelo	5	1.2.55	5 dogs	1 Vac. 4 N.V.
Hartley	1	26.11.54	1 dog	N.V.
Insizia	1	23.8.55	1 dog	N.V.
Inyanga	6	30.7.55	6 dogs	N.V.
Lomagundi	4	17.5.55	3 dogs 1 jackal	N.V.
Lupane	nil	—	—	
Makoni	10	14.4.55	8 jackals 2 dogs	N.V.
Marandellas	4	15.8.55	4 dogs	1 Vac. 3 N.V.

Native District	*Number of Cases*	*Date of Last Case*	*Species*
Matobo	1	1.8.55	1 dog N.V.
Mazoe	4	23.7.55	2 jackals N.V. 2 dogs
Melsetter	1	24.9.55	1 dog N.V.
Mrewa	6	28.9.55	5 dogs N.V. 1 bovine
Mtoko	17	18.7.55	14 dogs N.V. 2 bovine 1 human
Ndanga	nil	—	—
Nuanetsi	nil	—	—
Nkai	nil	—	—
Nyamandhlovu	nil	—	—
Salisbury	1	13.11.54	1 jackal
Sebungwe	1	15.12.54	1 bovine
Shangani	nil	—	—
Selukwe	1	5.8.55	1 dog N.V.
Umtali	6	7.4.55	5 dogs 1 Vac. 4 N.V.
Urungwe	5	4.1.55	1 pig 1 Vac. 5 dogs 4 N.V.
Victoria	1	25.11.54	1 dog Vac.
Wankie	1	1.8.55	1 dog N.V.
Wedza	1	4.1.55	1 dog N.V.

Results according to Species:—

Canine	81
Feline	1
Bovine	4
Jackal	12
Human	1
Pig	1
TOTAL	100

This is 83 less than in the previous year. Total cases confirmed since the outbreak: 716.

A total of 9 vaccinated dogs including 2 with unknown vaccination dates, succumbed to the disease.

The following is an interesting case:—

B. 294—A Cat.	Inoculated	28.1.55
	Paralysis left hind leg ...	23.2.55
	Paralysis both hind legs	24.2.55
	Died	27.2.55

The biological test was clinically positive, but Negri Bodies were not demonstrated.

In view of the fact that there were 83 cases less this year than last year, one assumes that the position has improved. Of the 100 cases recorded, 12 were in jackals. A significant point is that 8 of the jackal cases occurred in the Makoni district and all during a very short period. The position in this district was extremely difficult. A farm to farm check was made and all dogs were vaccinated and what is of even more importance all dogs were accounted for.

The employment of Canine Destruction Officers in tie-up areas has certainly been an effective method of control. Difficulty, however, has been experienced in recruiting conscientious personnel. The year closed with only one officer on the strength.

During the year a total of 105,380 dogs was vaccinated or re-vaccinated, making a grand total of 444,316 vaccinations since the beginning of the outbreak. Despite these impressive figures of dogs vaccinated, it is my considered opinion that in certain areas the production of dogs has been less than required to effect the 70% blanket of immunity necessary to bring the disease under control.

Once again there have been several instances of inoculated dogs developing rabies. Nine cases are recorded of vaccinated dogs succumbing to rabies (7 vaccinated over three months and 2 vaccinated strays from which there is no record of vaccination dates).

Again it is emphasized that rabies cannot be eliminated from the territory without the full co-operation of the public but unfortunately in many areas this certainly has not been forthcoming. It is only after several unfortunate incidents,

in which the dangers of this disease have been vividly demonstrated, that the general public show an active interest.

The Native dog owner has been blamed for a lot but in this respect it has been amply proved that production of dogs for inoculation purposes in most Native reserves has been good.

The outbreak has now lasted five years and in spite of the efforts of the Department the end is not yet in sight.

Tuberculosis

A. Importations—Total tested, 1,584. Reactors, 4.

B. Exportations—Total tested, 727. Reactors, nil.

C. Umtali Eradication Scheme—

Scheme A.	Number of Farms . . .	7
	Number of cattle . . .	793
	Number of reactors . .	nil
Scheme B.	Number of Farms . . .	3
	Number of cattle . . .	533
	Number of reactors . .	nil

D. Voluntary Scheme—

Umtali . . .	Number of herds . . .	32	
	Number of cattle . . .	1,482	
	Number of reactors . .	nil	
Bulawayo . .	Number of herds . . .	52	
	Number of cattle . . .	3,509	
	Number of reactors . .	5	(in 4 herds)
Salisbury . .	Number of herds . . .	85	
	Number of cattle . . .	9,334	
	Number of reactors . .	3	(in 2 herds)
Gwelo . . .	Number of herds . . .	21	
	Number of cattle . . .	1,477	
	Number of reactors . .	6	(in 4 herds)
Melsetter . .	Number of herds . . .	19	
	Number of cattle . . .	1,214	
	Number of reactors . .	2	
Compulsory Tests	Number of herds . . .	2	
	Number of cattle . . .	187	
	Number of reactors . .	58	
Total number of cattle under test		18,342	
Total number of herds under test		219	
Total number of reactors under test . . .		16	

(This does not include the Compulsory tests).

It will be noted that there are 70 herds more on test than in the previous year, bringing a further 4,817 head under test.

It is obvious from these figures that substantial gains have been made in the campaign against tuberculosis in cattle. Of the total number of farms under test 209 are on a voluntary basis, in other words they did not come under any scheme whereby the owners were compensated for the reactors slaughtered.

There was one exception which had been carried over from the previous year. The owner of this herd had decided to slaughter all his reactors and restock with Tuberculin Tested cattle.

During the year Government agreed to the introduction of a compensation scheme on a purely voluntary basis. Broadly speaking, where reactors are 5% or less, the owner slaughters reactors and no compensation is paid, but if over 5% reactors are detected the owner receives 30% of the value of the animal, with a maximum of £50 for a cow and £100 for a bull plus the slaughter value. Where an animal is totally condemned at slaughter the owner receives a further 20% of the value of the animal up to the same maxima as above.

Now that Government has wisely introduced an incentive such as indicated above, it is more than likely that the voluntary testing scheme will increase to such an extent that the Deparment with its limited resources will not be able to handle the position unless the professional staff is increased accordingly. The records of all tests completed show that to date very few herds have been heavily infected.

Meanwhile, credit is certainly due to those stockowners who were wise enough to take the plunge and have their herds tested. It now must be a considerable source of satisfaction to them to own a T.T. Herd.

At the same time the members of the Department who induced owners to take up voluntary testing are to be complimented on their efforts.

Earlier, reference was made to two compulsory tests of 187 head with 58 reactors. In both these cases whole milk was supplied to the public. One shudders to think of the damage that may have been done to human health. It is hoped that infection in these herds was of recent origin and not disseminated in the milk.

Tuberculin testing of a large ranch herd in Matabeleland was continued during the year. The results were rather disappointing, but not unexpected. Of 12,505 European-owned cattle 265 reacted (2.1%) and of 1,652 Native-owned, 28 reacted (1.08%). For economic reasons it has not been found possible to slaughter all reactors and these have been placed on a separate section. These reactors are constantly breaking back to their original mobs and thus keeping infection alive. The ranch in question has adopted a fencing programme and this should be of tremendous value in eradicating the disease.

Meat Inspection Incidence:—

Cold Storage Commission, Bulawayo	Bovine 64	Porcine 57
„ „ „ Salisbury	„ 42	„ 33
„ „ „ Fort Victoria ...	„ 9	„ 2
„ „ „ Umtali	„ 4	„ 7
Canning Factory, West Nicholson	„ 149	„ nil

Heartwater

Confirmed cases were as follows:—

Bulawayo 61, Melsetter 6. Total 67.

This is a very low figure. The mortality is considered to be very much higher that that stated. Stockmen in the heartwater areas are well acquainted with the disease and no longer report losses.

On a ranch in Matabeleland, where a Veterinarian is employed, heartwater vaccine is produced and used extensively on the ranch with excellent results.

The Department is constantly called upon to produce a vaccine, but owing to lack of facilities this is impossible at present. There are numerous factors at present which militate against production.

Piroplasmosis

Confirmed cases were as follows:—Bulawayo 26, Salisbury 53, Fort Victoria 22, Gwelo 21, Umtali 38, Melsetter 22. Total 182.

Again it can be stated without fear of contradiction that the figures given are out of all proportion to the actual number of cases. The disease is well known to the stockowner and unless he is in serious trouble he seldom reports mortality. Various very useful drugs are on the market and stockowners are therefore in the happy position of undertaking their own treatment.

Quarter Evil

Outbreaks were confirmed as follows:—

Bulawayo . .	25 outbreaks . . .	43 deaths	(A further 22 outbreaks reported with 142 deaths).
Salisbury . .	63 outbreaks . . .	243 deaths	
Fort Victoria .	7 outbreaks . . .	39 deaths	
Gwelo . . .	16 outbreaks . . .	28 deaths	
Umtali . . .	7 outbreaks . . .	14 deaths	
Melsetter . .	10 outbreaks . . .	25 deaths	

The above is considered to be a small percentage of the actual incidence. During the year conditions were favourable for outbreaks of this disease. It is deplored that this disease, for which control is so cheap, should ever be allowed to occur. Failure to adopt an annual vaccination programme is a reflection on the stockowners.

The Department produces and sells its own vaccines and an assortment of other vaccines is available.

Associated with Quarter Evil, Malignant Oedema has been confirmed on 5 properties, with a mortality of 19 head.

Contagious Epididymitis and Vaginitis

During the year new centres of infection were confirmed as follows:—Bulawayo 6, Salisbury 16, Gwelo 2, Umtali 1. Total 25.

Releases from quarantine were:—Bulawayo 10, Salisbury 8, Gwelo 3, Melsetter 2. Total 23.

In quarantine at the end of the year:—Bulawayo 21, Salisbury 87, Fort Victoria 17, Gwelo 8, Umtali 2. Total 135.

It is not very encouraging to record that a number of centres released from quarantine, some two to three years ago, have had to be placed in quarantine again as the result of a flare up of the disease due in most cases to the introduction of clean cattle. These introductions become infected in due course from the supposedly clean herd and there would appear to be an exaltation of virulence of the dormant virus and herd immunity lapses. Although the above makes depressing reading the actual disease position in infected herds has shown a steady improvement. The fertility rate in these herds has improved.

At one time it was thought possible to undertake a bi-monthly inspection of dairy herds. Unfortunately this was impossible to keep up owing to staff limitations and the usual practice adopted now is inspections at six-month intervals.

A considerable amount has been done on this disease but to date little progress can be reported. For diagnostic purposes there is a crying need for a reliable test. At present diagnosis is based on the clinical picture and from the foregoing it appears that the clinical evidence is not sufficient to release a farm from quarantine restrictions.

Contagious Abortion

Infection was confirmed on premises as under:—Bulawayo 14, Salisbury 49, Gwelo 12, Umtali 9, Melsetter 6. Total 90.

3,678 blood samples were tested, giving 374 reactors.

Over the last three years efforts have been made to make the farming community more conscious of this particular disease and to encourage annual inoculation with S.19 vaccine now that an assured supply is available. The response has been slow but more stock-owners are now availing themselves of the vaccine. Consideration has been given to compulsory inoculation of breeding stock but this has been turned down for various reasons.

It is lamentable that greater use is not made of a vaccine which would rid the country of this disease.

Sheep Scab

A total of three outbreaks were recorded and brought under control.

Senkobo Skin Disease

Outbreaks were recorded in the Wankie, Lupane and Sebungwe Native Districts. It is estimated that 82 head succumbed to the disease. In the areas concerned dipping of cattle was not systematic and the variegated bont tick was much in evidence.

Lumpy Skin Disease

The disease appeared during January in a very mild form. Losses were negligible and were confined to two herds. No leg lesions were noted, but merely the occasional lesion on the body. No more than 2-3% infection in any one herd was noted. Lumpy skin disease vaccine was obtained from Onderstepoort but results were difficult to assess. In general the vaccine appeared to have little effect on the course of the disease.

SCHEDULED POULTRY DISEASES

Spirochaetosis

Three outbreaks, with a light mortality, were recorded.

Coccidiosis

This is an extremely common condition in this territory. A total of 15 outbreaks were confirmed, with heavy losses in chicks. It is thought that the incidence, as quoted above, is not a true indication of the actual position.

Fowl Typhoid

Bulawayo . . .	7 outbreaks
Salisbury . . .	12 outbreaks
Gwelo	1 outbreak
Umtali	3 outbreaks
Melsetter . . .	1 outbreak
TOTAL . .	24 outbreaks

Varying mortality was reported from these outbreaks. "Neftan" was used on a number of properties to control deaths, with slaughter eradication thereafter.

Bacilliary White Diarrhoea

No outbreaks of this disease were reported. The practice of annual testing of flocks continued throughout the year and brought a certain number of reactors to light, which were promptly slaughtered.

A total of 148 B.W.D. free certificates were issued covering 98,813 birds.

It is evident that this annual certification of flocks serves a very useful purpose but there has been no increase in staff to carry out these duties.

Fowl Cholera

A total of 15 outbreaks were confirmed and 1,501 birds were slaughtered. Mortality was heavy in all outbreaks. Most of the outbreaks were associated with Native compounds or mines.

Newcastle Disease

An outbreak was confirmed in the Matobo district on a farm close to the Mafeking-Bulawayo railway line. The outbreak occurred late in June, 1955, but no report of mortality was received until mid July, when almost half the flock had succumbed. The remainder of the flock, some 98 birds, was destroyed on the 25th July.

All poultry on the adjacent farms were vaccinated. No adverse results followed these vaccinations and no further outbreaks were recorded. The source of the outbreak has not been ascertained.

Chicken Pox and Roup

These two conditions were commonly met with during the year but were of little significance.

NON SCHEDULED DISEASES

Anaplasmosis

Cases have been confirmed as follows:—Bulawayo 74, Salisbury 243, Fort Victoria 29, Gwelo 43, Umtali 56, Melsetter 63. Total 508.

As stated above these are confirmed cases, but the figures for unconfirmed cases must be very much higher than those recorded.

The disease is only too well known to the stock owner who normally undertakes treatment of infected animals himself. In common with all tick borne diseases the answer is in the stock owner's hands, i.e. conscientious dipping.

Paratyphoid

Many deaths in calves are attributed to this condition. Major outbreaks have not been recorded. Stock owners are averse to vaccination but it is noted that more use is being made of prophylactic vaccination than in previous years.

Horsesickness

Cases were confirmed as follows:—Bulawayo 1, Salisbury 36, Gwelo 54 Umtali 13, Melsetter 9. Total 113.

In comparison with the previous year, when only 12 deaths were recorded, the figure is high. Admittedly the year being wet in the first part, and a mild winter following, was ideal for the vector. The majority of horses in the territory are inoculated and owners are now casting doubts upon the efficacy of the freeze dried vaccine.

During the 1952/53 season a total of 125 cases were recorded.

Biliary Fever (Horses)

A total of 9 cases were recorded.

Sweating Sickness

A widespread incidence was recorded following upon a flush of bont legged ticks. It was also noted that the incidence in dairy herds was lower than usual and this has been attributed to the use of the organic insecticides.

Myiasis

Here again a heavy incidence was recorded.

Opthalmia

This condition was more marked than in previous years, a hyper-acute form being recorded in one district.

Coccidiosis (Cattle)

With the exception of two severe outbreaks, where deaths were recorded in 3-year-old oxen, the incidence of this condition was no higher than that recorded in previous years.

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Agalactia

This condition was first encountered in July 1953, in both the Fort Victoria and Umtali districts. At first the condition was thought to be of dietetic origin and experimental feeding of in-pig sows was undertaken. The condition was reproduced in two sows. However, a further wave was encountered in the Fort Victoria district in July of this year. There is no reliable evidence to disprove the original contention that some toxic factor is present in the rations. The condition does not give rise to any visible thermal or systematic reaction.

It has also been found that no animal developed the condition twice. From this, it appears that there is some form of immunity set up in the animal's body.

In the meantime investigation is still proceeding.

Ephemeral Fever

Little to report in this connection and no mortality is recorded.

Verminosis

Optimum conditions for helminthiasis prevailed and most herds of bovines and ovines carried a heavy infestation. Regular dosing of stock was only practised by the few. Only when the condition of stock has dropped to a dangerous level is action taken and usually only the poorest animals are treated, a false and useless economy. Departmental propaganda stressed this very important aspect of animal husbandry during the year.

Rift Valley Fever

This condition was confirmed in the Nyamandhlovu Native District. In 9 dairy herds 101 abortions were recorded. Blood samples from infected herds were positive to either Rift Valley Fever or Wesselsbron virus and in one case to both.

Other Diseases

Isolated outbreaks were encountered of Blue tongue in cattle and sheep, Tick-borne paralysis of sheep and in one instance Breezy Brae disease.

Poisoning

Arsenic: Bulawayo 314, Salisbury 329, Fort Victoria 9, Gwelo 49, Umtali 32, Melsetter 51. Total 784.

Mineral Various: Salisbury 37, Gwelo 5, Umtali 3, Melsetter 14. Total 59.

Vegetable: Bulawayo 22, Salisbury 95, Umtali 13, Melsetter 120. Total 250.

Artificial Insemination

This service comes under the Veterinary Laboratory. In the Salisbury district the calls for semen have increased greatly with the result that the service is a great success. This is not the case in Bulawayo where little interest has been taken. It was hoped to open centres at Gwelo and Umtali during the year but there was little call for semen, with the result that supplies to these centres were discontinued.

Meat Inspection

The inspection of meat for human consumption is undertaken by this Department at the Cold Storage Commission Works at Bulawayo, Fort Victoria, Umtali and Salisbury, also at Liebigs Canning Factory at West Nicholson.

The meat inspecting staff come under the control of the District Veterinary Officers in these areas and consequently are in close touch with the Feld staff. Useful information gleaned on the abattoir floors in therefore passed on to the Field branch for application on farms.

It is with pleasure that I acknowledge the help and co-operation given by the various departments in the Agricultural Division, also the Departments of Health, Native Affairs and Police.

In conclusion, I wish to express my thanks and appreciation to all members of the staff for their continued loyalty, willingness and enthusiasm shown during the year under review.

STOCK SLAUGHTER FIGURES

	Cattle	*Pigs*	*Sheep and Goats*
Bulawayo	60,482	16,862	28
Salisbury	61,584	47,447	10,305
Umtali	7,965	9,504	2,353
Fort Victoria	24,874	5,635	838
West Nicholson (Liebig's)	11,031	670	—
TOTALS	165,936	80,118	13,524

This is a decided drop, the comparable figures for the previous year are: Cattle, 168,511; Pigs, 103,030; Sheep and Goats, 19,694.

CARCASE CONDEMNATIONS

	Cattle	*Pigs*	*Sheep and Goats*
Bulawayo	672¼	248	—
Salisbury	597¾	44¼	41
Umtali	143	46	14
Fort Victoria	422¼	15	—
West Nicholson (Liebig's)	56½	4¾	—
	1,891¾	358	55

MAIN REASONS FOR CONDEMNATIONS

	Cattle	*Pigs*	*Sheep and Goats*
Emaciation	410	13	32
Measles	528	274	—
Oedema	238	—	1
Sarcocysts	73	2	—
Bruising	39½	2	3
Pleurisy and Peritonitis	44	2	—
Pyaemia	31½	11	—
Tuberculosis	30	7	—

CATTLE CENSUS AND DIPPING TANKS

	European	*Native*	*Total*	*Dip Tanks*	*Sprays*
Bulawayo	402,346	681,539	1,083,885	1,081	29
Salisbury	345,864	316,181	662,045	1,600	160
Fort Victoria	163,436	405,638	569,074	528	6
Gwelo	230,693	262,202	492,895	983	5
Umtali	70,484	142,011	212,495	423	21
Melsetter	49,941	39,859	89,800	236	2
TOTALS	1,262,764	1,847,430	3,110,194	4,851	223

IMPORTATION OF LIVESTOCK, 1954–55

	South Africa	*United Kingdom*	*Eire*	*Bechuana-land*	*Northern Rhodesia*	*Basuto-land*	*Total*
Bulls	295	5	—	—	1	—	301
Cows	76	—	—	10	—	—	86
Calves	13	—	—	10	—	—	23
Heifers	927	32	—	—	—	—	959
Oxen	—	—	—	1	—	—	1
Mares	143	6	1	—	—	—	150
Stallions	48	2	—	—	—	1	51
Geldings	329	9	—	—	2	—	340
Mules	103	—	—	—	6	—	109
Pigs	55	3	—	79	—	—	137
Sheep	735	—	—	3,620	—	—	4,355
Goats	176	—	—	2,221	—	—	2,397
				TOTAL			8,909

Bovine, 1,370; Equine, 650; Porcine, 137; Ovine, 4,355; Caprine, 2,397

EXPORTATION OF LIVESTOCK, 1954–55

	Northern Rhodesia	*Nyasa-land*	*Belgian Congo*	*South Africa*	*Bechuana-land*	*P. East Africa*	*United Kingdom*	*Total*
Bulls	21	4	41	—	22	2	—	90
Cows	160	—	—	—	—	—	—	160
Calves	16	3	—	—	—	—	—	19
Heifers	279	20	536	10	—	—	—	845
Oxen	15	—	—	—	—	108	—	123
Mares	3	—	—	6	—	—	—	9
Stallions	—	—	—	5	—	—	—	5
Geldings	4	—	—	4	1	—	1	10
Mules	—	—	—	12	—	—	—	12
Donkeys	95	—	43	—	—	—	—	138
Pigs	125	7	118	—	—	4	—	254
Sheep	702	1	460	—	—	—	—	1,163
Goats	255	—	—	—	—	—	—	255
					TOTAL			3,083

Bovine, 1,237; Equine, 174; Porcine, 254; Ovine, 1,163; Caprine, 255.

J. MACKINNON,
Assistant Director of Veterinary Services (Field).

ANNUAL REPORT FOR 1955

STAFF

The present staff at the Laboratory consists of the Assistant Director, one senior veterinary officer, two junior veterinary officers, one woman junior professional officer, two technical assistants, one clerk, one typist, two stockmen and one lay inseminator. This represents an addition of one technical assistant during the year.

We have, however, been without the presence of the Assistant Director Mr. D. A. Lawrence, who has been acting Director of Veterinary Services since December, 1954, following the retirement of Mr. J. S. Adamson. The problem of further technical assistance is being held in abeyance until the question of extension of the Research Laboratory is decided.

BUILDINGS

During the year, some internal reconstruction resulted in the provision of a room entirely for rabies work and also a sterile room for culture work, thus fulfilling two very definite necessities.

In addition a sum of money has been passed for the provision of a new vaccine block cum library which should be completed during the year 1955-56. A request has also been made for the erection of sties and pens capable of holding pigs and sheep, as at present no proper buildings exist for experimentation with such animals.

VETERINARY INVESTIGATION OFFICERS

With the opening up of new lands for ranching and the upgrading of both beef and dairy herds, we find a natural ever increasing demand on the veterinary services, and although this has been partly supplied by the formation of Farmers' Veterinary Associations and the appointment of veterinary surgeons to these Associations, it is obvious that this method can never satisfy the full requirements, firstly because of economic reasons — there are many areas in the country which cannot support even a partly government subsidized veterinarian — and secondly because of the diversity of the problems existing — the practising veterinarian cannot afford either the time or the facilities necessary for the study of such problems.

Many of these problems are outside the scope of the routine field officer who to-day in the rush of duties associated with the numerous scheduled diseases existing in the country has more than enough to occupy his time. There is a very definite place in this country for the veterinary investigation officer, an individual, who, having the basic laboratory training, can yet be sent to the field to investigate unusual conditions reported by either the field officer or the practising veterinary surgeon.

Such problems as agalactia in pigs, sterility in dairy cattle, low fertility in ranch cattle, parasitological problems and deficiency diseases would all come under the scope of such an officer, who must be considered as a mobile unit, capable of being dispatched anywhere in the country at short notice.

At least three such investigation officers are necessary to give the country even minimal cover. The recommendations of the Federal Cattle and Beef Marketing Committee issued October, 1954, make it obvious that such an extension of the veterinary services is not only necessary but essential if the cattle industry of the Federation is to assume its rightful place in the development of the country.

ROUTINE SERVICES

DIAGNOSTIC SERVICES

Smear Examination

Following the policy established in 1954 whereby the Salisbury District Office dealt with all smears from that district, this year has seen a further reduction in the number of smears examined. The total number of smears examined was 2,141 and the following diagnosis made:—

Piroplasmosis	10
Theileriosis	19
Anthrax	1
Quarter Evil	4
Trypanosomiasis	628

(T. congo, 535; T. vivax, 78; T. brucei, 5; mixed, 8; unidentifiable, 2)

Heartwater	1
Spirochaetosis	2
Anaplasmosis	3

In addition to the above field smears 2,174 smears were examined from animals undergoing redwater and gallsickness vaccination at the Laboratory stables.

Serological Tests

The major serological test now carried out is the agglutination test for contagious abortion—this year 5,937 samples were submitted and tested. Four hundred and eight of these were positive, 81 premises being involved. This represents a decrease of 4,175 from the previous year, although it is obvious from the figures of vaccine sold that more and more farmers are interested in the eradication of this disease.

Other Diagnostic Methods

A total of 1,011 specimens were received during the year, 264 of these being for rabies diagnosis. The following diseases and conditions have been diagnosed:—

Rabies	100 cases
Contagious Epididymitis	9 cases
Lumpy Skin Disease	1 case
Tuberculosis	2 cases
Internal Parasites	41 cases
Poisioning	63 arsenical
	10 potash
	2 mercury
	1 sodium
	1 lead
	1 copper

While the majority of poisoning cases are accidental and due to carelessness several cases of deliberate arsenical poisoning have occurred. Dip owners who use arsenical dips are again warned to be extremely careful with the disposal of this very deadly almost indestructible poison.

Mastitis

Ten cases of streptococcal and 19 cases of staphylococcal infection were diagnosed. An increasing number of cases of apparent resistance to antibiotics are being reported, due possibly to under-treatment with the selected drug, thus revealing one of the disadvantages of the ready availability of practically all the known antibiotics to the general public.

Tuberculin Tests

Sixty-seven animals were tested in the Laboratory stables — all passed. The single intradermal comparative test was undertaken using Weybridge tuberculin.

Poultry — Report submitted by Mr. J. H. Darbyshire

The following conditions have been diagnosed:—

Coccidiosis	209 cases
Chronic Respiratory Disease	41 cases
Fowl Cholera	16 cases
Fowl Typhoid	38 cases
B.W.D.	3 cases
Fowl Pox	3 cases
Aegyptionella	4 cases
Visceral lymphomatosis	174 cases
Neural lymphomatosis	14 cases
Fowl Malaria	1 case
Avitaminosis A	1 case
Ascariasis	6 cases
Faevus	1 case
Histomoniasis	4 cases

It is obvious that the question of the general health of the poultry in the Colony is concomitant with the reorganization of the industry as a whole and it is equally apparent that the detection of destructive diseases in birds assumes a position of greater importance than hitherto.

This Laboratory, in this respect, appears to be the only place where detailed investigation of poultry diseases occurs, for specimens are received from districts in the Colony other than Salisbury. The majority of poultry disease investigation, however, takes place in the latter district, due, no doubt to the fact that the Laboratory is situated here, and the convenience accorded thereby.

The number of poultry post-mortems performed during the year showed that these are on the increase; 1,330 birds being examined as against 1,245 in the previous year. The blood testing of poultry for B.W.D. and fowl typhoid was continued throughout the year by the Field staff, with occasional birds being presented for cultural examination and confirmation. All recognized breeders'

flocks are tested in accordance with regulations and it is considered that this represents approximately 90% of the Colony's birds. The incidence of B.W.D. appears to be on the decrease. Fowl typhoid, on the other hand, has doubled in incidence. Happily the introduction of furazolidone, which is lethal to Salmonella, has proved a useful weapon in keeping this disease under control. The incidence of "carriers" remaining after treatment is of a very minute order. The final method of elimination, however, still remains with flock blood testing and destruction of reactors.

Coccidiosis is also on the increase. The deep-litter system is considered to be at fault here and the high incidence of other parasites in this system is known. The addition of any proprietary brand of "Premix" to the mash as a prophylactic appears efficacious and for treatment the use of sulphamezathine, nitrofurazone or sulphaquinoxaline have been advocated with success. Disinfection of the houses, where practicable, with 10% aqueous ammonia, has also been advised.

The incidence of chronic respiratory disease (C.R.D.) formerly known as roup, as distinct from the condition of avitaminosis A, is also high. The predisposing factor of limited ventilation appears to be the main cause although once infection is established it spreads quickly throughout the houses.

A poultry house having a frontage of 20′ by 6′ 6″ high and having a large open area in this wall in accordance with government specifications, should have additional ventilation in the form of a hole approximately 3½′ to 4′ square in the back wall beneath the dropping board. During winter this could be closed but open throughout the summer, as the incidence of C.R.D. jumps in the months of September to November. Medication of the drinking water with thiasolium and the isolation of affected birds are additional successful modes of treatment.

A more serious note is struck by the increase in the incidence of fowl cholera. This was probably introduced into the Colony by wild water-fowl and spread by the movement of poultry by the migrant indigenous population. The Lomagundi district was first infected, the disease then spreading to Hartley and Mazoe areas. The main danger with this condition it is felt, is that the more chronic it becomes, the more difficult it will be to detect.

Lymphomatosis in its various forms continues to be the cause of death in poultry in a fair percentage of cases. This disease originates in an hereditary susceptibility although work in the United Kingdom seems to indicate that spread by contact is increasingly important in addition to the recognized infection through the egg. It would appear that there are few recognized breeders free of this condition in their flocks.

Histomoniasis has been diagnosed in poultry this year, causing initial heavy mortality. This disease appears to be self-limiting, however, and the mortality eventually ceases as suddenly as it appears. Only furazolidone has been tried in treatment so far although 2-amino-5-nitrothiazole is about to be introduced.

Losses in very young chicks due to chilling and brooder conditions were heavy during the year and seem to occur sometimes under the best conditions.

The majority of the remaining conditions diagnosed during the year are given in the list of diseases.

PREVENTIVE AND CURATIVE SERVICES

Vaccines and Remedies

While this year's figures of sales of vaccines and remedies in general, show an increase, they are far below what they should be, thus stressing the continued necessity for urging more use of preventive measures. No farmer to-day, on economic grounds alone, can afford not to vaccinate against such conditions as quarter evil and contagious abortion.

Quarter Evil Vaccine

Total sales for the year were 400,897 doses approximately a 51,000 increase on last year. It is obvious from these figures that a very large amount of preventive vaccination is taking place but when compared with the total cattle population of approximately 3,000,000 the amount is relatively small. However, a survey of the past few years' figures show that there is a consistent increase throughout.

It must again be pointed out that this vaccine only gives an immunity from 12 to 15 months so that all cattle between the ages of 6 months and 3 years must be vaccinated annually. One case of reported vaccination failure when investigated, showed that it was at least 18 months since the animal had last been vaccinated. Four cases of reported failure were investigated and proved to be due to Clostridium Septique — a related organism against which our

Clostridium Chauveii vaccine does not protect. We are now preparing a Septique vaccine for issue only on request or to those areas where the condition exists. The decision to issue this vaccine separately and not to add it to our quarter evil vaccine was made in order not to increase the cost of the latter vaccine in case this had a prejudicial effect on its use.

Horsesickness Vaccine

Four thousand and seventeen doses of this vaccine were sold during the year, a drop of just over 500 from the previous year.

Redwater and Gallsickness Vaccine and Immunization of Cattle

A total of 171 animals were received at the Laboratory for redwater and gallsickness vaccination. Only two of these were Rhodesion bred. Twelve bulls and 55 females were received from the United Kingdom while the remaining animals, 34 bulls and 68 females, originated from the Union of South Africa.

With the expansion of the Artificial Insemination service two stable units have had to be taken out of general use, thus reducing the total accommodation available to 57 head of cattle. A further complication is occasioned by the fact that all importations from the United Kingdom have to undergo a three weeks period of quarantine. It is hoped, however, that the opening of the Plumtree quarantine station may alleviate this situation.

At present the combined redwater and gallsickness vaccine is used for cattle up to 9½ months of age while the limit for gallsickness vaccine is put at one year.

The number of doses of redwater and gallsickness vaccine issued was 5,269 while gallsickness alone totalled 15,370. Owing to an unprecedented demand for the latter vaccine from several large ranches we were unable to supply the demand from our own bleeders and the major portion of this vaccine was supplied to us by the Director of Veterinary Services, Onderstepoort.

This increased use of the vaccine is very gratifying as there is no doubt that on some ranches gallsickness can be considered as one of the main hazards of cattle raising.

Contagious Abortion Vaccine

Fifty-four thousand two hundred and eighty-five doses of this vaccine were distributed during the year representing almost a 10,000 increase on last year's distribution. While this is extremely encouraging we have no room for complacency. Indeed this is the time to increase our campaign for the eradication of this condition. From the last four or five years' figures the percentage of infected cattle is in the region of 5 to 7%. Contagious abortion would appear to exist in the country at a relatively low level but unless strenuous efforts are made now to eliminate it we may not remain in this comparatively fortunate position. These figures are assessed from the blood samples sent to the Laboratory for diagnosis. During the year we undertook a check of one day's milk intake at the Salisbury premises of the Dairy Marketing Board using the ring test and showed that out of 10,303 gallons coming into Salisbury every day 2,427 showed a positive reaction to the test. This represents 23.55% of the total. This is a relatively heavy infection and must mean the exposure of a considerable number of people handling cattle and milk, to the dangers of brucellosis. Farmers are being urged more and more to use vaccination as a preventive measure and not to wait until the condition is widespread in their herds.

Anthrax Vaccine

A considerable increase has occurred this year in the number of doses issued. Ninety-two thousand two hundred and ninety-six doses have been used, more than double last year's requirement. Most of this increase has been due to outbreaks in Native reserves and the necessity for giving a sufficiently wide cover to prevent the spread of infection.

Calf Paratyphoid Vaccine

Five thousand five hundred and sixty-five doses of the calf vaccine have been issued and 821 doses of the vaccine for adults—as the efficacy of this latter type is realized there will no doubt be an increase in its use.

Other Vaccines

The following issues have also been made:—

Lamsiekte	150 doses
Enterotoxaemia	1,500 „
Blue Tongue	1,700 „
Fowl Pox	211,000 „
Fowl Typhoid	5,999 „
Newcastle Disease	2,000 „

Remedies

Tetram 319 gallons, nodular worm remedy 1,159 tins and blow fly spray 199 gallons were sold. The drop in quantities of the above two worm remedies does not mean less treatment for parasites because the volume of anthelmintics sold by commercial firms in the country has increased enormously. We recommend that the routine treatment of sheep should take place at least every three weeks if proper control is to be obtained and that all young cattle between the ages of 3 months and 2 years should be treated at least four times in the year. Phenothiazine although comparatively expensive is considered to be the best all round anthelmintic.

ARTIFICIAL INSEMINATION—REPORT SUBMITTED BY MR. D. K. SHONE

Staff

The service continues to be operated by a full-time inseminator and a veterinary surgeon who is only part-time occupied with this duty. A post for an inseminator to be stationed in Bulawayo was created during the year. This post was filled for about four months by an inseminator being stationed at Salisbury while undergoing instruction, however, he resigned at the end of that period and the post at present remains vacant.

Bulls

The bull strength now stands at four Friesland and two Jersey bulls. The Friesland bulls, M. V. W. Paul XIII, Lendy Simpson and Roodebloem Pearls Eldon, have been introduced into the service during the year. Roodebloem Pearls Eldon has not been brought into full use as approval for his use on registered cows has as yet not been received.

The bull Schaapkraal Draman was returned to Gwebi Agricultural College.

Came Gerards Beme has just completed his third year of use in the centre and continues to give good service.

The two Jersey bulls, Fairseat Volunteers Pacifier II and Dooringlaagte Daydream Parmant III have given efficient service throughout the year and semen has been available at all times. The demand for Jersey semen is, however, extremely poor.

General

The bulls continue to be maintained on a high protein ration and are tethered outside in paddocks during the day.

The previous uncertainty of obtaining a collection and the sluggishness of the bulls has been completely overcome. The time now occupied with collecting semen from two bulls is not more than ten minutes, in contrast to the hour or more it entailed in the past.

In order to combat the prevalence of foot-rot which has been experienced in previous years, a foot bath has been constructed in close proximity to the stables and the bulls are walked through a 10% copper sulphate solution weekly.

Semen

Except for a short period when one bull had to be worked continuously with a resultant drop in the normal high quality, the semen has been of high standard and on no occasion has there been a failure to collect. On occasions, additional collections have, however, had to be made to meet unexpected heavy demands.

Inquiries were made into the possibility of the use of a semen diluent with a gelatine base for which a retention of fertility for seven days was claimed. An unfavourable report on the conception rates obtained with this diluent was received from the Union and as a result its contemplated introduction into the service was abandoned.

The diluent in use remains one consisting of equal quantities of egg yolk and a 3.92% sodium citrate solution to which is added penicillin and streptomycin to give final concentrations of 500 international units and 400 micrograms respectively per ml. of diluted semen.

Semen Used by the Inseminator

The resignation of the additional inseminator engaged for Bulawayo area continues to make the Salisbury area the only one where the full-time services of an inseminator are available.

One thousand eight hundred and sixty-nine inseminations were performed and a total of 31,374 miles covered, an average of 16.78 miles per insemination.

Transport has again been a problem which has cropped up from time to time during the year and at least three vehicles have been used. It is, however, hoped that when the inseminator receives a loan for the purchase of a private car for use on official service these problems will be largely overcome. During a period of three months when a private car was used for this work, at no time did resource have to be made to government vehicles.

Short Courses on Artificial Insemination

Only a limited number of short courses for farmers could be given during the year due to the absence of the veterinary officer in charge on two months' vacation and the inseminator on three months' vacation.

The number attending such a course is necessarily very restricted owing to the personal instruction required and the limited number of cows available for practical work.

No fixed dates for these courses are laid down but on the receipt of sufficient applications a suitable date is determined and the applicants informed accordingly. The course normally occupies two to three days depending on the availability of specimens. The success attained by these farmers depends upon the ability of the individual and the number of inseminations he performs.

Semen Other than that Used by the Inseminator

(a) *Semen Dispatched to Bulawayo*

The semen is dispatched twice weekly to Bulawayo by rail for redistribution and use by officers of the Department. The demand has decreased considerably due to the poor conception rates being attained in that area. The poor conception rates were considered to be the effects of travelling on the semen and the greatly increased dilution as compared to the past.

The semen had been dispatched in single dose quantities which resulted in excessive aeration. Dispatching the semen in bulk has apparently led to visual improvement.

The establishment of a full-time inseminator should improve the position as all semen could be dispatched in a deep frozen state which will obviate any possible deleterious affects of travel.

(b) *Semen Dispatched to Other Areas*

A total of 1,779 doses of semen was dispatched to various parts of the country for use by veterinary surgeons and farmers. The results obtained by farmers are very variable and depend chiefly on individual ability in performing the insemination.

The collection of semen on Sundays which made it available to all areas for six days of the week was discontinued after a year as no satisfactory arrangement could be reached to compensate the officer for the time spent in making these collections. Semen is now collected on Monday morning and Wednesday afternoons, thus making it available in areas other than Salisbury, for only five days in the week.

Details of Semen Supplied—

Used by inseminator	1,869
Used by District Veterinary Officers, Bulawayo and Gwelo	577
Used by Veterinary Surgeons and Farmers	1,779
Used on Department's animals	91
TOTAL	4,316
Number of doses of Friesland semen	3,847
Number of doses of Jersey semen	469

Details of Mileage Covered—

Inseminations of Government animals	1,092
Inseminations on contagious sterility quarantine farms	13,470
Inseminations on clean farms	16,812
TOTAL	31,374

Details of Semen Used by Inseminator—

	Friesland	*Jersey*	*Total*
On contagious sterility quarantine farms	670	Nil	670
On clean farms	973	226	1,199
On Gwebi Research Station	80	11	91
TOTALS	1,723	237	1,960

Revenue—

Mileage—16,812 miles @ 1s. per mile	£840	12s.	0d.
Semen—4,226 doses @ 15s. per dose	£3,169	10s.	0d.
Railage	£56	5s.	4d.
TOTAL	£4,066	7s.	4d.

Deep Frozen Semen

A consignment of 10 doses of deep frozen Friesland semen was flown from the United Kingdom by a local farmer. The semen was stored at the Laboratory in a half gallon thermos flask liner, sunk in a block of expanded ebonite and the whole held in a refrigerator. Four Friesland heifers were inseminated with the semen and three conceived. The fourth was eventually found to have an ovarion dysfunction and before this was corrected, the semen was lost due to failure in arrival of two consignments of dry ice.

Of the three heifers which conceived, two had premature calves which died. The third heifer calved normally.

At one stage it appeared that the service would largely have to be operated with imported deep frozen semen and in view of the experience gained in handling the earlier consignment it was decided to import a large consignment for trial use in the ordinary operation of the service. In order to extend the holding period of the dry ice, a commercial deep freeze cabinet was purchased in which the dry ice is stored in one gallon thermos flask liners, insulated with expanded ebonite.

One hundred doses of Friesland semen and 25 doses of Jersey semen were obtained from Cambridge in England and this was used in the normal operating of the service. The conception rates available are from one farm only. Nineteen cows were inseminated, of which 5 have returned, giving a conception rate of 73.7% based on a non-return basis.

As deep frozen semen has a viability period of only eight hours on thawing, its use is limited to those areas where an inseminator is stationed.

Due to the limited quantity of dry ice available, it is not possible to dispatch any deep frozen semen to individuals.

The imported deep frozen semen can only be used on grade animals as the Breed Societies will not register any progeny from registered dams inseminated with this semen.

This trial has shown that deep frozen semen can be imported with success from other countries and stored here over a considerable period, thus allowing the farmer who wishes to obtain semen from a specific bull in another country or from a breed not available from this centre, to do so with confidence.

One of the advantages in deep freezing semen is that it offers the farmer a nominated service instead of having to accept the semen available, which may be from any one of a number of bulls. He can thus select a particular bull and have all his cows inseminated with semen from that bull. It also overcomes the problem of a bull returning to his daughters where only a small number of bulls are held, as in this centre.

With the purchase of the low temperature cabinet work was resumed on deep freezing semen. The technique used to deep freeze semen as described in last year's report was discarded due to the limited number of ampoules which could be frozen at one time and the relatively large amount of dry ice required. The following technique was developed which requires a minimal quantity of dry ice and gives a good viability on thawing.

Semen is collected and diluted according to the recognized technique to give a final concentration of 10% glycerine. The semen is then transferred to ampoules and placed in an alcohol bath at $+5^\circ$ C and this placed in the low temperature cabinet. This cabinet operates at a temperature of approximately -25° C. The volume of alcohol in the bath is adjusted in order that cooling from $+5^\circ$ C to -10°C takes from 28 to 30 minutes. The ampoules are then transferred to smaller alcohol baths at -20° C and these placed in the one gallon thermos liners, containing the dry ice, where the temperature is reduced to -79° C.

A pilot trial with this semen was carried out in a herd and 24 first inseminations were performed. No selection of cows was made, but they were inseminated as they came on heat. Pregnancy examinations were carried out on 23 of the animals (one had been sold and was not available for examination).

Of these 23 examined 12 were found to be in calf, giving a conception rate of 55% on first inseminations. This is a very satisfactory rate and compares favourably with the overall conception rate of 50% for first inseminations obtained in the Salisbury area.

Rabies

During the year 264 specimens were submitted for examination and 100 of these proved positive either histologically or biologically.

The number of vaccinated breakdowns throughout this year has been 9, but 3 of the cases were strays so that no vaccination date can be given. Among the remaining 6 cases, 2 had been vaccinated twice, 1 had been vaccinated 3 years prior to confirmation of disease and the other 3 were vaccinated at least 3 to 9 months previously. One vaccinated cat died showing paralytic symptoms but was histologically negative. Two successive biological tests proved clinically positive but no negri bodies were found in the mouse brains. This case was probably one of vaccinal rabies—it has since been confirmed that this can happen when low egg passage vaccine is used in cats.

Investigations of these breakdowns was continued on similar lines to those indicated last year.

1. *Viability of the Vaccine*

Further tests have been carried out on samples of vaccine exposed to field conditions during periods of 4 to 7 days and in no case has there been any recordable deterioration of the vaccine.

Viability tests were carried out on reconstituted vaccine under field conditions. These tests were carried out in January, April, July and October, in order to obtain exposures to extremes of temperatures, etc., to which the vaccine might be exposed —the temperature variation ranged from 68° F in July to 88° F in October. The unconstituted vaccine was exposed to room temperature for 24 hours prior to commencement. In all cases the vaccine was reconstituted at 9 a.m. and exposed in the open, but not direct sunlight, until 4 p.m., and samples withdrawn at 0, ½, 1, 2, 3, 5, 6, 24, 48 and 72 hours after reconstitution and a series of mice inoculated intracerebrally with 10^{-2} and 10^{-3} dilutions.

In no case was there any deterioration of the vaccine under 3½ hours' exposure and since the manufacturers state that the vaccine should be used within 2 hours of reconstitution and our vaccinators had instructions to use the vaccine within a maximum of 1 hour it is difficult to see how deterioration of the vaccine is responsible for the breakdowns.

2. *Administration of the Vaccine*

We consider that the technique of our vaccinators is of fairly high standard and while it is recognized that the human error factor can never be dismissed completely, the work of Dr. Howell at Onderstepoort has shown that Flury vaccine even in a 1/100 dilution is capable of protecting dogs against challenge. This suggests that even an inefficient vaccination has a reasonable chance of conferring adequate immunity.

Work on the antibody content of vaccinated dogs was continued to the point when it was becoming obvious, through the irregularity of the results obtained, that this was not a very fruitful line of investigation. This was confirmed at the rabies conference in July, 1955, in Kenya, where it was definitely stated that in dogs the antibody response to rabies vaccination was extremely erratic. It is therefore obviously impossible to estimate from the antibody content of the blood whether successful vaccination has taken place.

It is recognized that with certain individuals, both humans and animals, successful vaccination does not take place. This may explain a few of our breakdowns, but for the major portion I feel we must conclude that vaccination has taken place but that for some as yet unknown reason the vaccinal response has been overwhelmed by the infecting dose of virus once the animal was exposed in infection. One factor still unknown is the effect of challenge with our virus strain on the Flury vaccinated dogs—this is now being undertaken.

CONTAGIOUS EPIDIDYMITIS AND VAGINITIS

Gwebi Epi-vag Station

No further building has been undertaken at the station.

During the year some of the buildings have been used for work other than epi-vag, for example to house the gallsickness infected animals (see special report) and also during investigation of non-specific abortions (work not yet completed).

A number of young bulls removed from the Laboratory herd have now reached a serviceable age and are shortly to be used for transmission experiments.

Past records have shown that a considerable variation in strains exist and this year we had a striking example of this, where a freshly infected herd

carrying an atypical infection was added to a herd where the disease had been in existence over a number of years. Within a period of months the owner had lost at least eight of the recently added animals with an extremely acute peritonitis and pleurisy and a very large proportion of the remaining animals were sterile because of peritoneal adhesions involving the fallopian tubules and ovaries. Several post-mortem examinations were carried out and in all cases the condition was similar to, but rather more acute than the type of peritonitis and pleurisy found in epi-vag herds.

Using vaginal discharges transmission experiments were conducted on cows at the Gwebi Station but the condition could not be reproduced, nor was any temperature reaction recorded. This virulent infection now appears to have disappeared and the disease is running its normal course.

The definite diagnosis of the cause of vaginal discharges continues to be extremely difficult, especially so as we have now recorded an apparently temporary non specific vaginitis following the use of several bulls — this is not considered to be a disease but merely a local reaction on the part of the vagina to the presence of the semen.

The use of Stilboestrol in heifers has on some occasions been followed by a vaginitis and pus — comparatively temporary in character — but clinically indistinguishable from contagious vaginitis.

Observations in Infected Herds

These observations were again carried on throughtout the year, it being considered that much general useful information was thus obtained.

One herd studied consisted of Friesland cows under good management and the owner was advised to adopt isolation of infected animals with disposal of sterile cows. This policy was adopted and throughly carried out. Only after two clean inspections were any previously infected cows allowed back into the clean herd. No direct service was permitted and artificial insemination undertaken with semen from owner's own bulls. A monthly check and speculum examinations were instituted. Once the sterile cows were eliminated the conception rate achieved from artificial inseminations undertaken by the farm manager was extremely satisfactory.

Approximately 8 months after the herd had been taken over and the monthly examination showed only one infected animal present a considerable breakdown occurred and five infected animals were found on inspection. Owner has now decided to divide the farm in two—build a new set of cow sheds and to move to the new portion of the farm only young animals under three months.

It is extremely difficult to see why the breakdown occurred as this method of eradication has been used successfully in the past.

The possibility of undertaking virus isolation work has been considered during the last few months and it is hoped that a member of the staff will be permitted to spend 3 to 6 months studying these techniques at Onderstepoort.

Techniques of artificially infecting young bulls are being studied since it is considered that the picture in the female is becoming extremely complicated by non-specific vaginitis.

Contagious Abortion

In view of the comparatively heavy concentration of brucella agglutinins recorded in humans in Southern Rhodesia, and the fact that a fair proportion of these are considered to be due to melitensis we have undertaken an investigation.

As far as we are aware no case of melitensis infection in the domestic or other animals has been diagnosed in Southern Rhodesia, but the majority of current text books do state that the Southern Rhodesian strain of abortion differs from the European and that although derived from cattle it resembles melitensis in its infectivity for man. We are therefore isolating as many strains as possible from cattle and these are being sent to the Ministry of Agriculture and Fisheries, Veterinary Laboratory at Weybridge for typing. In addition we are also examining blood samples from positive cases of contagious abortion in cattle and endeavouring to type these here by use of the agglutinin absorption test.

Finally a survey is being undertaken for brucella agglutinins in the blood of pigs, sheep and goats passing through the Cold Storage Commission Works at Salisbury.

Gallsickness

We have recognized for some time past that a considerable variation exists in the virulence of field strains of Anaplasma marginale principally because of the failure in certain areas of our A centrale vaccine strain to give protection and it was felt that if it were possible to obtain a relatively avirulent strain of marginale it could be used for experimental work.

We have succeeded in obtaining such a strain locally and at least two passages have been undertaken without any evidence of apparent increase in virulence. Since there is no way of differentiating this strain from a virulent field one and as the only method of keeping the strain alive is by animal passage, great care must be taken to ensure that the animals used for the passages are not carrying a field strain.

In view of the considerable risk associated with its primary use it is felt that it would be useful as a booster dose immediately following centrale vaccination. In addition it will be a useful strain with which to conduct therapeutic trials — an important necessity in view of the fact that to date we have no specific drug for gallsickness which is still considered one of our most severe diseases of stock.

Rift Valley Fever

The investigation of a heavy apparently non specific abortion rate in cattle in the Bulawayo area, which was at first thought to be associated with ergot poisoning proved to be due to Rift Valley fever following the forwarding of blood samples to the Director of Veterinary Services, Onderstepoort.

In 1952, Onderstepoort confirmed the presence of Rift Valley fever agglutinins in a bovine in the Umtali area.

Although we have always recorded a number of non-specific abortions, there was no obvious increase until this year when on one farm near Bulawayo a very heavy increase occurred.

The percentage of positives, according to the Union reports, is unusually heavy and in addition several animals are positive to the Wesselsbron virus — this is a virus which has been isolated in the Union and is apparently related to, but not identical with Rift Valley fever virus.

It is hoped to undertake some survey work on the actual extent of existing infection and the Director of Veterinary Services, Onderstepoort, has intimated his willingness to deal with any samples we send down.

Rift Valley fever has been known to exist in Kenya for many years and is a mosquito transmitted condition capable of causing heavy losses in lambs and abortion in ewes and cows besides being extremely infective for man, with unpleasant results.

Poultry—Administration of Antibiotics

An experiment to compare the effects of aureomycin in the drinking water on the growth rates of penned and free range chicks has been commenced, but no results are as yet available. All the birds are being fed standard growers mash, without the addition of any green food, since the free range birds have access to the same star grass paddock as that on which the penned birds are being housed in moveable units.

Low Fertility in Ranch Cattle

This work which was undertaken as an official investigation at the end of 1954 had been instigated at the request of a progressive ranch company early in 1954.

The basic problem lay in the low calf crop which over the previous years had averaged out at 56% — this included cows and heifers and considering the good standard of management on the ranch these figures can be taken as correct. It was felt that the problem could best be tackled by examining a number of marked cattle throughout the breeding season. A survey of approximately 400 animals throughout the year showed that there appeared to be two problems, (1) animals conceiving but losing their calves after the sixth month and (2) animals with dormant ovaries. Both problems occur in heifers and in cows and are both being investigated.

1. *Animals conceiving but losing their calves*

During the initial work when it was found that by the end of April the conception rate had gone up to 75%, the possibility of foetal absorption due to a protein drop in the grass was thought to be a factor. An experiment where groups of cattle were supplemented with (a) protein in the form of cubes and (b) minerals ad lib, over a period of two months was instituted. No fall in the pregnancy rate could be noted in either of those two groups or in the controls. When the final calf figures were submitted, however, it was found that from the sixth month of pregnancy onwards there had been a loss of approximately 15% — half of this loss appeared to be prior to calving and half subsequently. A blood check of these animals revealed no evidence of contagious abortion.

During the normal year there is a considerable deterioration in the condition of these cows by the time the calving period commences, i.e. 15th September. It is unfortunate also that those last three months of pregnancy, adjudged the most important from the growth rate of the calf, should be the lowest as far as the feed value of the grazing is concerned.

It is of interest to note that in at least two herds where high calving percentages are obtained, that the bulls are put in in August, thus shifting the calving period to the beginning of the dry season. This shift also means that the breeding season covers that period of highest temperature and lowest humidity which has been recorded in Nyasaland as giving the highest conception rate in native cattle.

This year we have checked 200 heifers in calf, half of which have been fed silage from May onwards — these calving results are not yet available.

2. *Animals with dormant ovaries*

Approximately 200 heifers, 3 and 4 year olds, were checked from February until August and roughly 20% were found to have dormant ovaries. These heifers were Afrikanders and although this breed is considered to become sexually mature at 18 months, previous results on the ranch — only 11% calvings when put to the bull at 24 months old — supported our findings. It was felt that nutrition must play a large part in this failure of the reproductive cycle. Under ordinary ranch conditions there is a considerable loss in weight during the dry season — this may be the factor causing the delay in sexual maturity. This factor, however, is present in the adult cattle. One hundred cows with calves at foot showed a 56% pregnancy rate and 36% ovaries non-functioning, whereas 100 cows with no calves at foot (i.e. did not have calves the previous year) showed a 96% pregnancy rate and 1% ovaries non-functioning. Since these cows were checked from February to August, which includes the best of our grazing season, it was thought to be more than a direct protein lack.

Work has also commenced on a study of 100 Afrikander heifers, 50 on a ranch and 50 on Grasslands Experimental Station, to be carried out throughout the next few years. The purpose of this check is to study the effect of different management of these cattle, the onset of sexual maturity and the effect on the breeding cycle of the addition of various minerals to the diet, etc.

Primarily an attempt is being made to balance the calcium-phosphorus ratio of the diet by the addition of phosphorus during these months when it is deficient in the grazing.

This problem of low fertility is the most important one existing in the beef herds of the country to-day, and until it is solved the cattle raising potential of Southern Rhodesia can never be fully realized.

This work necessitates full co-operation between the various government departments involved and the cattle breeders of the country.

MISCELLANEOUS

Veterinary Short Course

The annual short veterinary course was held in the beginning of September this year and was attended by 45 people.

The course, which lasted for five days, consisted of lectures, demonstrations and a series of short films and was considered by the majority of the people attending it to be extremely useful, especially to those who either farmed or ranched in areas where a veterinary surgeon is not available. The basis of these courses is to enable the farmer to undertake the collection of specimens, certain inoculations and treatments himself and to get a grounding in the general rules of preventive medicine.

Agricultural Show

This year's show exhibit concentrated on Artificial Insemination giving the public an idea of the benefits which such a service makes available to the farmer.

Visit to Conference

In July this year, in company with Mr. Lawrence, Acting Director of Veterinary Services, a visit was paid to the Rabies Conference held in Kenya under the auspices of the W.H.O. and the C.C.T.A.

This conference which consisted of a series of lectures, practical work, demonstrations and discussions was attended by delegates from the majority of the countries in Africa.

The conception of the course was the dissemination of all the most recent information on rabies, the standardization of the various techniques associated with the diagnosis of rabies, the preparation of vaccines and the methods of control and finally the exchange of ideas between the delegates with the promotion of the ideal of complete elimination of rabies from the African continent.

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